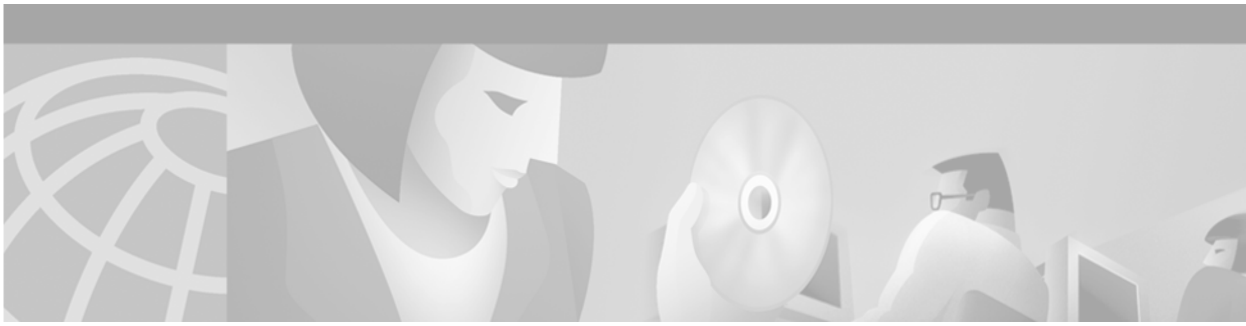


# Catalyst 6000 Family Network Analysis Module Installation and Configuration Note

**WS-X6380-NAM**

This publication describes how to install the Catalyst 6000 family Network Analysis Module (NAM) and how to configure the NAM using the Catalyst command-line interface (CLI), the NAM Traffic Analyzer application, or both. See the "Related Documentation" section on page 73 for more information about software configuration for the switch.

**Note** For translations of the warnings in this publication, see the "Safety Overview" section on page 6 and refer to the Regulatory Compliance and Safety Information for the Catalyst 6000 Family Switches.

# Contents

This publication consists of these sections:

Cisco Systems

**Corporate Headquarters:**
**Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA**

# Overview

This section describes the Catalyst 6000 family NAM, how it operates, and how to manage it, and includes these sections:

## Understanding How the NAM Works

The NAM monitors and analyzes network traffic for the Catalyst 6000 family switches using remote monitoring (RMON), RMON extensions for switched networks (SMON), and other management information bases (MIBs). The NAM supports the following RMON groups:

- RMON groups defined in RFC 1757
- RMON2 groups defined in RFC 2021

In addition to extensive MIB support, the NAM also can monitor individual Ethernet VLANs, which allows it to serve as an extension to the basic RMON support provided by the Catalyst 6000 family supervisor engine.

You can use TrafficDirector, or any other IETF-compliant RMON application, to access link, host, protocol, and response-time statistics for capacity planning, departmental accounting, and real-time application protocol monitoring. You also can use filters and capture buffers to troubleshoot the network.

The NAM can analyze Ethernet VLAN traffic from one or both of the following sources:

- Ethernet, Fast Ethernet, Gigabit Ethernet, trunk port, or Fast EtherChannel SPAN or RSPAN source port

  For more information about SPAN and RSPAN, refer to the “Configuring SPAN and RSPAN” chapter in the *Catalyst 6000 Family Software Configuration Guide*.

  **Note** Cisco IOS software currently does not support RSPAN.

- Netflow Data Export (NDE)

  For more information about NDE, refer to the *Catalyst 6000 Family Software Configuration Guide*.

The NAM is managed and controlled from either the embedded web-based NAM Traffic Analyzer application (directing a web browser at the NAM) or a Simple Network Management Protocol (SNMP) management application, such as those bundled with CiscoWorks2000, or both.

## Managing the NAM

The NAM Traffic Analyzer application provides access to the NAM data and voice traffic management and monitoring features through a web browser. To use the NAM Traffic Analyzer application, you first need to do some basic configuration tasks on the NAM using the CLI. You then can start the NAM Traffic Analyzer application with a single command. Refer to the *User Guide for the Catalyst 6000 Network Analysis Module Traffic Analyzer* for more information about using the NAM Traffic Analyzer application.

With NAM Traffic Analyzer, you can do the following tasks:

- Configure SPAN resources
- Configure collections
- Monitor statistics
- Capture and decode packets
- Set and view alarms

For added security, you can use both the CLI (using the **ip http secure** command) and the NAM Traffic Analyzer application to configure the NAM to use a remote TACACS+ server. For information about configuring the TACACS+ server remote database, refer to the *User Guide for the Catalyst 6000 Network Analysis Module NAM Traffic Analyzer.* A TACACS+ server can be used for authentication and authorization for your web-based users. You also can use a local database on the NAM for security.

You also can manage the NAM using an SNMP management application such as the Cisco TrafficDirector real-time network management application or NetScout nGenius Real-Time Monitor (RTM). To use RMON and SNMP agent support, you configure the NAM using the CLI.

Refer to the following URL for more information about using RTM:

http://www.cisco.com/univercd/cc/td/doc/product/lan/cat6000/fam_mod/rel2_1_2/ol_2428.htm

For more information about TrafficDirector and RTM, refer to the CiscoWorks2000 documentation.

For more information about the NAM Traffic Analyzer application, refer to the *User Guide for the Catalyst 6000 Network Analysis Module Traffic Analyzer.*

If you have a NAM that is already configured and running in the switch, and are familiar with the NAM, you can begin using the NAM Traffic Analyzer application by entering the **ip http server enable** CLI command, then starting NAM Traffic Analyzer in your browser.

## New NAM Features

These new features are included in the NAM:

- Catalyst 6000 NAM Traffic Analyzer

  The NAM software release 2.1 includes the embedded NAM Traffic Analyzer application for monitoring and troubleshooting the availability and health of your network. The NAM Traffic Analyzer application provides browser-based access to the NAM RMON1, RMON2, SMON, DSMON, and voice monitoring features.

  For information about enabling and using the NAM Traffic Analyzer application, see the application online help or see the PDF version of *User Guide for the Catalyst 6000 Network Analysis Module Traffic Analyzer* in the online help.

- The licensed Application Response Time (ART) MIB, which is used to determine the source of the slowdowns in application performance. The ART MIB measures the response time on the network at the transport layer.

**Note** You must purchase an ART MIB license from Cisco Systems before enabling and using the ART MIB feature.

- The licensed voice-monitoring application.

**Note** You must purchase a separate software license to enable voice collection on the NAM.

- Both Media Gateway Control Protocol (MGCP) and Session Initiation Protocol (SIP) voice protocols are now supported.
- Signalling Connection Control Part (SCCP) and H.323 voice protocols are now supported.
- The trap destination table is available when you enter the **show snmp** CLI command.

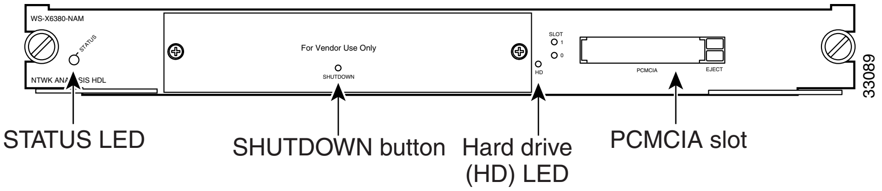
**Note** Cisco IOS does not support the **show snmp** CLI command.

- You can upgrade the maintenance image while the application is running.

# Front Panel Description

The NAM front panel (see Figure 1) includes a STATUS LED, hard drive LED, SHUTDOWN button, and PCMCIA slot.

*Figure 1 Network Analysis Module*



## STATUS LED

The STATUS LED indicates the operating states of the NAM. Table 1 describes the LED operation.

*Table 1 STATUS LED Description*

| Color | Description |
|---|---|
| Green | All diagnostic tests pass. The NAM is operational. |
| Red | A diagnostic other than an individual port test failed. |

*Table 1 STATUS LED Description (continued)*

| Color | Description |
|---|---|
| Orange | Indicates one of three conditions:<br>• The NAM is running through its boot and self-test diagnostic sequence.<br>• The NAM is disabled.<br>• The NAM is in the shutdown state. |
| Off | The NAM power is off. |

## SHUTDOWN Button

**Caution** Do not remove the NAM from the switch until the NAM has shut down completely and the STATUS LED is orange. You can damage the NAM if you remove it from the switch before it completely shuts down.

To avoid corrupting the NAM hard disk, you must correctly shut down the NAM before you remove it from the chassis or disconnect the power. This shutdown procedure is normally initiated by commands entered at the supervisor engine CLI prompt or the NAM CLI prompt.

If the NAM fails to respond to these commands properly, you must use the SHUTDOWN button on the front panel to initiate the shutdown procedure.

To push the button, use a small pointed object (such as a paper clip).

The shutdown procedure may require several minutes. The STATUS LED turns off when the NAM shuts down.

## Hard Drive Activity LED

The hard drive (HD) activity LED is lit when the hard drive is in use.

## PCMCIA Slot

The PCMCIA slot provides access for up to two standard PCMCIA cards (now known as PC cards) and is reserved for future use.

# Specifications

Table 2 describes the specifications for the NAM.

*Table 2 Specifications*

| Specification | Description |
|---|---|
| Dimensions (H x W x D) | 1.18 x 15.51 x 16.34 in. (30 x 394 x 415 mm) |
| Weight | Minimum: 3 lb (1.36 kg)<br>Maximum: 5 lb (2.27 kg) |
| Environmental conditions: | |
| Operating temperature | 32 to 10°F (0 to 40°C) |
| Nonoperating temperature | –40 to 167°F (–40 to 75°C) |
| Humidity | 10 to 90%, noncondensing |

# Safety Overview

Safety warnings appear throughout this document in procedures that may harm you if performed incorrectly.

For additional safety information, refer to documents listed in the "Related Documentation" section on page 73.

**Warning** **This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

**Warning** **WaarschuwingDit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het document *Regulatory Compliance and Safety Information* (Informatie over naleving van veiligheids- en andere voorschriften) raadplegen dat bij dit toestel is ingesloten.**

**Warning** **VaroitusTämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä julkaisussa esiintyvien varoitusten käännökset löydät laitteen mukana olevasta *Regulatory Compliance and Safety Information* -kirjasesta (määräysten noudattaminen ja tietoa turvallisuudesta).**

**Warning**

**AttentionCe symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d'avertissements figurant dans cette publication, consultez le document *Regulatory Compliance and Safety Information* (Conformité aux règlements et consignes de sécurité) qui accompagne cet appareil.**

**Warning**

**WarnungDieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Dokument *Regulatory Compliance and Safety Information* (Informationen zu behördlichen Vorschriften und Sicherheit), das zusammen mit diesem Gerät geliefert wurde.**

**Warning**

**AvvertenzaQuesto simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nel documento *Regulatory Compliance and Safety Information* (Conformità alle norme e informazioni sulla sicurezza) che accompagna questo dispositivo.**

**Warning**

**AdvarselDette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du vare oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. Hvis du vil se oversettelser av deadvarslene som finnes i denne publikasjonen, kan du se i dokumentet *Regulatory Compliance and Safety Information* (Overholdelse av forskrifter og sikkerhetsinformasjon) som ble levert med denne enheten.**

**Warning**

**AvisoEste símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. Para ver as traduções dos avisos que constam desta publicação, consulte o documento *Regulatory Compliance and Safety Information* (Informação de Segurança e Disposições Reguladoras) que acompanha este dispositivo.**

**Warning** **¡Advertencia!Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. Para ver una traducción de las advertencias que aparecen en esta publicación, consultar el documento titulado *Regulatory Compliance and Safety Information* (Información sobre seguridad y conformidad con las disposiciones reglamentarias) que se acompaña con este dispositivo.**

**Warning** **Varning!Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du varamedveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. Se förklaringar av de varningar som förkommer i denna publikation i dokumentet *Regulatory Compliance and Safety Information* (Efterrättelse av föreskrifter och säkerhetsinformation), vilket medföljer denna anordning.**

**Warning** **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**

# Software Requirements

Table 3 lists the NAM software versions supported by Catalyst OS and Cisco IOS software.

*Table 3 NAM Software Compatibility*

| NAM Software | | Catalyst Software | Cisco IOS Software |
|---|---|---|---|
| Application Image | Maintenance Image | | |
| 1.1(1a) | 1.1(1a)m or later | 5.5(1) to 6.3(1) | Not applicable |
| 1.2(1), 1.2(2) | 1.2(1a)m | 6.1(1d) or later | 12.1(8a)EX with Supervisor Engine 2 with an MSFC 2. |
| 1.2(3) | 1.2(1a)m | 5.5(1) or later | 12.1(8a)EX or later with Supervisor Engine 2 with an MSFC 2.<br>12.1(11b)E or later with a Supervisor Engine 1A with an MSFC 2, or a Supervisor Engine 2 with an MSFC 2. |
| 2.1(1a) | 1.2(1a)m | 6.1(1d) or later | Not applicable |
| 2.1(2) | 1.2(1a)m | 6.1(1d) or later | 12.1(11b)E or later with a Supervisor Engine 1A with an MSFC 2, or a Supervisor Engine 2 with an MSFC 2. |

# Hardware Requirements

For Catalyst OS, any Catalyst 6000 or 6500 series switch with any supervisor module is supported using Supervisor Engine 1, 1A, or 2. For Cisco IOS, any Catalyst 6000 or 6500 series switch with a Supervisor Engine 1A (or Supervisor Engine 2) with an MSFC2 if it is running 12.1(11b)E. If the switch is running the older 12.1(8a)EX, a Supervisor Engine 2 with an MSFC2 is required.

# Required Tools

**Note** Before installing the NAM, you must install the Catalyst 6000 family switch chassis and at least one supervisor engine. For information on installing the switch chassis, refer to the *Catalyst 6000 Family Installation Guide*.

These tools are required to install the NAM in the Catalyst 6000 family switches:

- Flat-blade screwdriver
- Phillips-head screwdriver
- Wrist strap or other grounding device
- Antistatic mat or antistatic foam

Whenever you handle the NAM, always use a wrist strap or other grounding device to prevent electrostatic discharge (ESD).

# Installing and Removing the NAM

**Warning** **During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.**

All Catalyst 6000 family switches support hot swapping, which allows you to install, remove, replace, and rearrange modules without turning off the system power. For more information on removing the NAM from a switch, see the "Removing the NAM" section on page 15.

When the system detects that a module has been installed or removed, it automatically runs diagnostic and discovery routines, acknowledges the presence or absence of the module, and resumes system operation with no operator intervention.

Installing and using the NAM requires the following:

- Perform the initial installation by placing the NAM in a switch.
- Go to switch CLI, session to the NAM CLI and provide a basic configuration
- Send a data source to the NAM (Netflow data, SPANned ports, VLANs, or etherchannels)
- Configure collection types of you want to monitor (RMON, voice, application response time, and other collection monitoring as required for your network).
- Configure alarms.
- View monitored statistics, alarms, and use packet capture or decode functionality.

This section describes how to install and verify the operation of the NAM in the Catalyst 6000 family switches and contains the following sections:

- Slot Assignments, page 10
- Verifying the Installation, page 14
- Removing the NAM, page 15

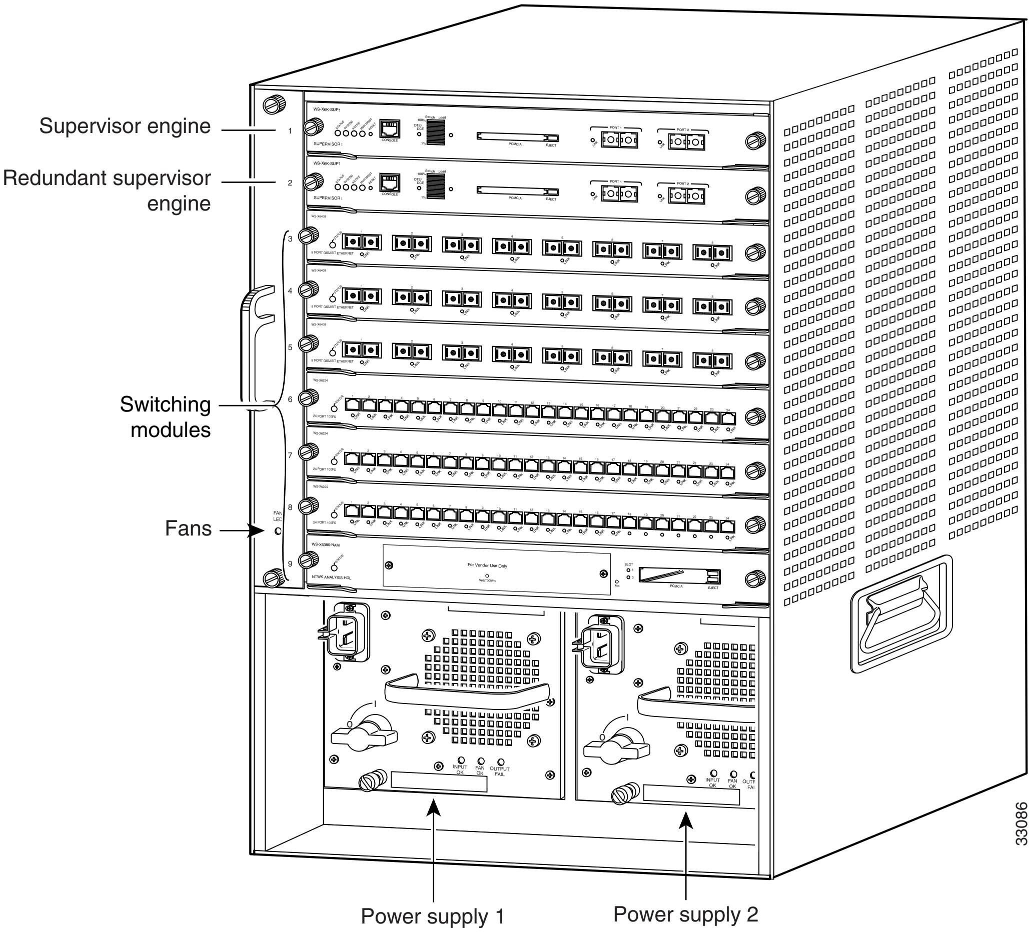
## Slot Assignments

The Catalyst 6006 and 6506 switch chassis have six slots, the Catalyst 6009 and 6509 switch chassis have nine slots, and the Catalyst 6513 switch chassis has thirteen slots. (See Figure 2.)

**Note** The Catalyst 6509-NEB switch has vertical slots numbered 1 to 9 from right to left. Install the modules with the component side facing to the right.

- Slot 1 is reserved for the supervisor engine.
- Slot 2 can contain an additional redundant supervisor engine in case the supervisor engine in slot 1 fails.
- If a redundant supervisor engine is not required, slots 2 through 6 on the 6-slot chassis, (slots 2 through 9 on the 9-slot chassis and slots 2 through 13 on the 13-slot chassis) are available for switching modules, such as the NAM.
- Install switching-module filler plates, which are blank switching-module carriers, in the empty slots to maintain consistent airflow through the switch chassis.

*Figure 2 Slot Numbers on Catalyst 6000 Family Switches*



# Installing the NAM

**Warning** **During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.**

To install the NAM in the Catalyst 6000 family switch, follow these steps:

**Step 1** Make sure you take the necessary precautions to prevent ESD damage.

**Step 2** Choose a slot for the NAM. (Refer to "Slot Assignments" section on page 10.)

**Note** You *must* install the supervisor engine in slot 1. You can install a redundant supervisor engine in slot 2. If a redundant supervisor engine is not required, slots 2 through 6 on the 6-slot chassis, (slots 2 through 9 on the 9-slot chassis and slots 2 through 13 on the 13-slot chassis) are available for switching modules.

**Step 3** If the desired slot is empty and is not covered by a switching-module filler plate, go to Step 5. Otherwise, loosen the captive installation screws (with a screwdriver if necessary) that secure the switching-module filler plate or the existing switching module in the desired slot.

**Warning** **Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.**

**Step 4** Remove the switching-module filler plate or the existing switching module.

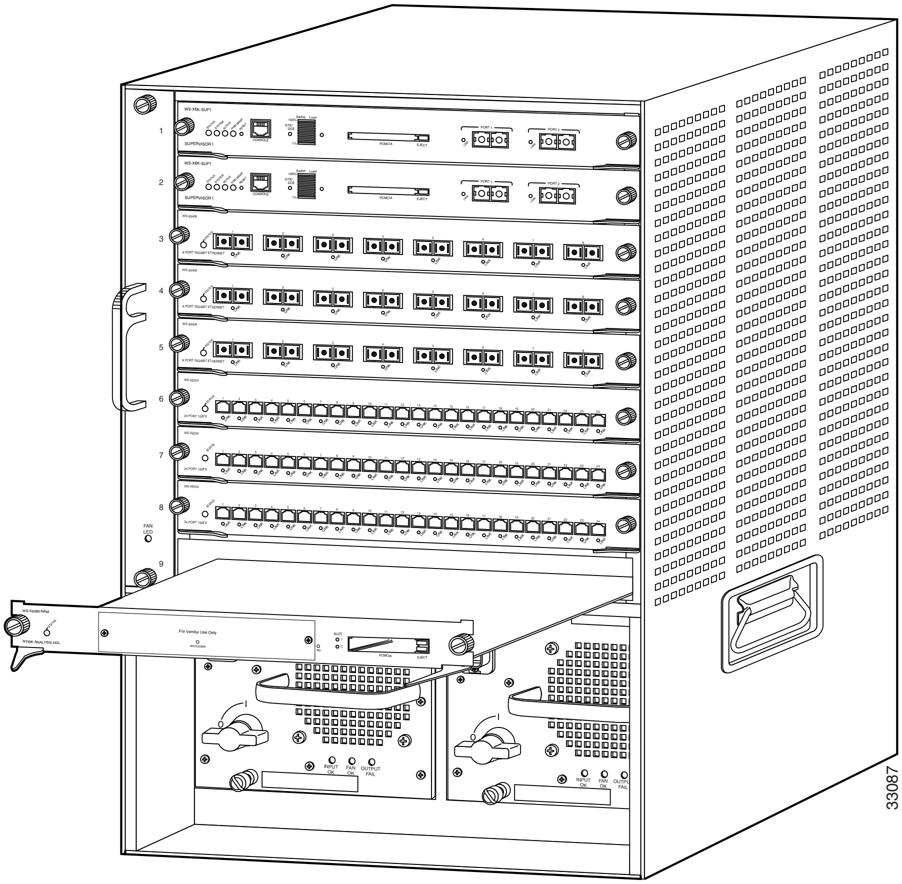
**Step 5** Hold the NAM with one hand, and place your other hand under the carrier to support the module.

**Caution** Do not touch the printed circuit boards or connector pins.

**Step 6** Place the module in the slot.

**Step 7** Align the notch on the sides of the switching-module carrier with the groove in the slot. (See Figure 3.)

***Figure 3 Installing Modules in the Catalyst 6000 Family Switch***



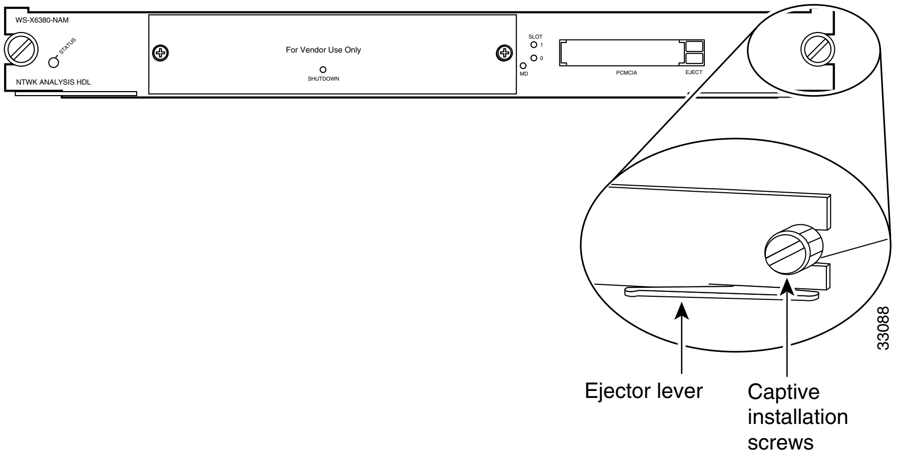
**Caution** Always use the ejector levers when installing or removing the NAM. A module that is partially seated in the backplane will cause the system to halt and subsequently crash.

**Step 8** Keep the NAM at a 90-degree orientation to the backplane (horizontal to the floor), and carefully slide the module into the slot until the notches on both ejector levers engage the chassis sides.

**Step 9** Using the thumb and forefinger of each hand, simultaneously pivot both ejector levers forward to fully seat the module in the backplane connector. (See Figure 4.)

**Note** If you perform a hot swap, the console displays the message “Module *n* has been inserted.” If you are running Cisco IOS, the console displays the message “Power to Module in slot n set on.” These messages do not appear when you are connected to the Catalyst 6000 family switch through a Telnet session.

***Figure 4 Ejector Levers and Captive Installation Screws***



**Step 10** Use a screwdriver to tighten the captive installation screws on the left and right sides of the NAM.

**Note** After you install or reinstall the NAM into a switch, you must log in to the NAM root account and configure the NAM parameters before you can use the NAM for network analysis. See the “Initial Configuration” section on page 24 for instructions on how to configure the NAM parameters.

# Verifying the Installation

These sections describe how to verify the installation of the NAM.

- Cisco IOS Software, page 14
- Catalyst OS Software, page 14

## Cisco IOS Software

To verify that the switch acknowledges the new NAM and has brought it online, enter the **show module** command.

This example shows the output of the **show module** command:

```
Router#show mod
Mod Ports Card Type                                  Model                   Serial No.
--- ----- --------------------------------------     ------------------       -----------
  2    2  Catalyst 6000 supervisor 2 (Active)         WS-X6K-SUP2-2GE         SAD0410050B
  3   48  48 port 10/100 mb RJ-45 ethernet            WS-X6248-RJ-45          SAD03080485
  5    2  Network Analysis Module                     WS-X6380-NAM            SAD05130AXB
  7    2  Intrusion Detection System                  WS-X6381-IDS            SAD05100HPT

Mod MAC addresses                       Hw       Fw               Sw           Status
--- -------------------------------     ------   ------------     ------------ -------
  2  0050.3e7e.70a2 to 0050.3e7e.70a3   90.223   6.1(3)           7.1(0.9)     Ok
  3  00e0.b0ff.9050 to 00e0.b0ff.907f    0.702   4.2(0.24)        7.1(0.9)     Ok
  5  0003.32bb.dacb to 0003.32bb.dacc    1.2     4B4LZ0XA         1.2(01)      Ok
  7  0003.3283.cae6 to 0003.3283.cae7    1.1     4B4LZ0XA         2.5(1)       Ok

Mod Sub-Module                  Model           Serial                   Hw     Status
--- --------------------------- --------------- ---------------       -------   -------
  2 Policy Feature Card 2       WS-F6K-PFC2     SAD040801JA           0.305     Ok
  2 Cat6k MSFC 2 daughterboard  WS-F6K-MSFC2    SAD04450FSS           1.1       Ok
```

When running Cisco IOS enter the **show interface GigabitEthernet** *slot*/ [**1** | **2**] command while logged in to the supervisor engine or console to verify that the switch acknowledges the new modules and has brought them online.

## Catalyst OS Software

To verify that the switch acknowledges the new NAM and has brought it online, enter the **show module** or **show port** [*mod/port*] command.

This example shows the output of the **show module** command:

```
Console> (enable) show module
Mod Slot Ports Module-Type               Model               Sub Status
--- ---- ----- ------------------------- ------------------- --- --------
1   1    2     1000BaseX Supervisor      WS-X6K-SUP1A-2GE    yes ok
15  1    1     Multilayer Switch Feature WS-F6K-MSFC         no  ok
3   3    2     Network Analysis Module   WS-X6380-NAM        no  ok
5   5    48    10/100BaseTX Ethernet     WS-X6248-RJ-45      no  ok
.
.
.
Console> (enable)
```

# Removing the NAM

This section describes how to remove the NAM from the Catalyst 6000 family switch.

**Caution** Do not remove the NAM from the switch until the NAM has shut down completely and the STATUS LED is orange or off. You can damage the NAM if you remove it from the switch before it completely shuts down.

**Warning** **During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.**

To remove the NAM, follow these steps:

**Step 1** Shut down the NAM by one of these methods:

- Cisco IOS software
  - From the root account on the NAM, enter the **shutdown** command.
  - In privileged mode from the CLI, enter the **hw-mod module** *mod* **shutdown** command. (When this command is used, you will have to enter the **hw-mod module** *mod* **reset** command in order to restart the NAM.)

    **Note** When the switch is rebooted, the NAM will reboot.

  - If the NAM does not respond to any commands from the NAM prompt or the supervisor engine, use a small, pointed object to access the SHUTDOWN button.
- Catalyst OS software
  - From the root account on the NAM, enter the **shutdown** command.
  - In privileged mode from the CLI, enter the **set module disable** *mod* command. (When this command is used, you will have to enter the **set module enable** *mod* command in order to restart the NAM.)

    When you enter the **set module disable** *mod* command, the specified NAM will remain disabled, even if the switch is rebooted, until you enter the **set module enable** *mod* command.
  - In privileged mode from the CLI, enter the **set module shutdown** *mod* command. This form of the command will shut down only the specified NAM.

    When you enter the **set module shutdown** command, the NAM will reboot if the switch is rebooted.
  - In privileged mode from the CLI, enter the **set module shutdown all** command.

    When you enter the **set module shutdown all** command, you will shut down every NAM installed in the switch.
  - If the NAM does not respond to any commands from the NAM prompt or the supervisor engine, use a small, pointed object to access the SHUTDOWN button.

**Note** Shutdown may require several minutes.

**Step 2** Verify that the NAM shuts down. Do not remove the NAM from the switch until the STATUS LED is off or orange.

**Step 3** Use a screwdriver to loosen the captive installation screws at the left and right sides of the NAM.

**Step 4** Grasp the left and right ejector levers. Simultaneously, pull the left lever to the left and the right lever to the right to release the NAM from the backplane connector.

**Step 5** As you pull the module out of the slot, place one hand under the carrier to support it. Avoid touching the module itself.

**Step 6** Carefully pull the NAM straight out of the slot, keeping one hand under the carrier to guide it. Keep the module at a 90-degree orientation to the backplane (horizontal to the floor).

**Step 7** Place the removed module on an antistatic mat or antistatic foam.

**Warning** **Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.**

**Step 8** If the slot is to remain empty, install a module filler plate to keep dust out of the chassis and to maintain proper airflow through the module compartment.

# Configuring the NAM

How you configuring the NAM on your switch depends on whether you are using Cisco IOS software or the Catalyst OS software. There are also NAM configuration tasks that are common to both switch operating systems.

The following sections describe how to configure the NAM from the CLI for each switch operating system:

- Cisco IOS Software, page 16
- Catalyst OS Software, page 24

When you have completed configuring the software-dependent attributes for the NAM, you can configure the software-independent attributes in this section:

- Operating System-Independent Configuration, page 31

## Cisco IOS Software

These sections describe how to remove the NAM from the Catalyst 6000 family switch when using Cisco IOS:

- Initial Configuration, page 17
- Configuring VLANs, page 19
- Using NetFlow Data Export as a Traffic Source, page 20
- Using SPAN as a Traffic Source, page 22

## Initial Configuration

Before you can use the NAM for network analysis, you must log into the NAM root account and configure the following:

- IP address
- Subnet mask
- IP broadcast address
- IP host name
- Default gateway
- Domain name
- If you are using a Domain Name Service (DNS), configure the DNS name server.
- If you are using external SNMP manager to communicate with the NAM, configure the following:
  - SNMP MIB variables
  - Access control for the SNMP agent
  - System group settings on the NAM
- Start the web server using the **ip http server enable** command.

To configure these parameters for the NAM, perform these steps in privileged mode:

**Step 1** Enter this command to verify that the NAM is installed and that the power is on:

```
Router# show module mod
```

**Step 2** Establish a console session with the NAM by entering:

```
Router# session slot processor 1
```

**Step 3** At the login prompt, type **root** to log in to the root account.

**Step 4** At the password prompt, type **root** as the root password.

**Note** If you have not changed the password from the factory-set default, a warning message displays. If you decide to change the password from the default, see the "Changing and Recovering the NAM CLI Passwords" section on page 48 for more information.

**Step 5** Configure the IP address and subnet mask by entering:

```
root@localhost# ip address ip-address subnet-mask
```

**Step 6** Configure the IP broadcast address by entering:

```
root@localhost# ip broadcast broadcast-address
```

**Step 7** Configure the IP host name used in the CLI prompt, **show** commands, and log messages by entering:

```
root@localhost# ip host name
```

**Step 8** Configure the default gateway by entering:

```
root@localhost# ip gateway default-gateway
```

**Step 9** Configure the domain name for the NAM by entering:

```
root@localhost# ip domain domain-name
```

**Step 10** Configure one or more IP addresses as DNS name servers by entering:

```
root@localhost# ip nameserver ip-address [ip-address]
```

**Step 11** Verify the NAM configuration by entering:

```
root@localhost# show ip
```

**Step 12** Configure the SNMP syslocation MIB variable by entering:

```
root@localhost# snmp location location-string
```

**Note** The MIB variables in Step 13 and Step 14 must be valid DisplayString texts, each with a maximum length of 64 characters.

**Step 13** Set the SNMP sysContact MIB variable by entering:

```
root@localhost# snmp contact contact-string
```

**Step 14** Set the SNMP sysName MIB variable by entering:

```
root@localhost# snmp name name-string
```

**Note** You can delete the SNMP location, SNMP contact, or SNMP name by entering the respective command without any parameters.

**Step 15** Set the SNMP agent community string parameter password for read-write access by entering:

```
root@localhost# snmp community community-string rw
```

**Step 16** Set the SNMP agent community string parameter password for read-only access by entering:

```
root@localhost# snmp community community-string ro
```

**Note** Clear the SNMP community string with the **snmp delete community** *community-string* command.

**Step 17** Verify the SNMP access controls and settings by entering:

```
root@localhost# show snmp
```

After completing this configuration, the NAM is ready to use with a network-monitoring application such as TrafficDirector or any other IETF-compliant RMON application.

**Note** If you are using RTM, you need to input the community strings in RTM exactly as you enter them in the NAM.

This example shows how to configure the NAM:

```
Router#session slot 8 processor 1
The default escape character is Ctrl-^, then x.
You can also type 'exit' at the remote prompt to end the session
Trying 127.0.0.81 ... Open
```

```
Cisco Network Analysis Module (WS-X6380-NAM)

login: root
Password:

Network Analysis Module (WS-X6380-NAM) Console, 2.1(1)
Copyright (C) 1999, 2000, 2001 Cisco Systems, Inc.

WARNING! Default password has not been changed!

root@localhost# ip address 172.20.52.29 255.255.255.224
root@localhost# ip broadcast 172.20.52.31
root@localhost# ip host nam1
root@localhost# ip gateway 172.69.2.132
root@localhost# ip domain cisco.com
root@localhost# ip nameserver 171.62.2.132
root@localhost# show ip
IP address:         172.20.98.167
Subnet mask:        255.255.255.192
IP Broadcast:       172.20.98.191
DNS Name:           namlab-shared.cisco.com
Default Gateway:    172.20.98.129
Nameserver(s):      171.69.2.133
HTTP server:        Enabled
HTTP secure server: Disabled
HTTP port:          80
HTTP secure port:   443
TACACS+ configured: Yes
Exsession:          On
root@localhost#
root@localhost# snmp location “Cisco Lab, Building X, Floor 1”

root@localhost# snmp contact “Jane Doe, Cisco Systems, (408) 111-1111”
root@localhost# snmp name “6k-NAM - Slot 2”
root@localhost# snmp community public ro
root@localhost# snmp community private rw

root@localhost# show snmp

SNMP Agent:   nam1.cisco.com   172.20.52.29

SNMPv1:  Enabled
SNMPv2C: Enabled
SNMPv3:  Disabled

community public  read
community private write

sysDescr         "Catalyst 6000 Network Management Module (WS-X6380-NAM)"
sysObjectID      1.3.6.1.4.1.9.5.1.3.1.1.2.223
sysContact       "Jane Doe, Cisco Systems, (408) 111-1111"
sysName          "6k-NAM - Slot 2"
sysLocation      "Cisco Lab, Building X, Floor 1"
root@localhost#
```

## Configuring VLANs

You must configure a VLAN for the NAM management port using the **switchport access vlan** *vlan-number* command.

## Using NetFlow Data Export as a Traffic Source

To use NetFlow Data Export (NDE) as a traffic source for the NAM, enable the NetFlow Monitor option to allow the NAM to receive the NDE stream. The statistics are presented on reserved ifIndex.3000.

NDE makes traffic statistics available for analysis by an external data collector. You can use NDE to monitor all Layer 3 switched and all routed IP unicast traffic. In a Catalyst 6000 family switch, both the PFC and the MSFC maintain NetFlow caches that capture flow-based traffic statistics. The cache on the PFC captures statistics for Layer 3-switched flows. The cache on the MSFC captures statistics for routed flows.

**Note** For information on configuring NDE, refer to the switch software configuration guide.

To configure NDE for the Cisco IOS, follow these steps:

**Step 1** Determine the current NDE configuration by entering:

```
Router#show running-config | include mls
mls rp nde-address 172.20.27.229
mls rp ip route-map
mls rp ip
no mls ip multicast aggregate
no mls ip multicast non-rpf cef
mls aging fast
mls flow ip full
mls flow ipx destination-source
mls nde flow include protocol tcp
mls nde sender
mls qos statistics-export interval 300
mls qos statistics-export delimiter |

Router#show running-config | include flow
mls flow ip full
mls flow ipx destination-source
mls nde flow include protocol tcp
 ip route-cache flow
 ip route-cache flow
 ip route-cache flow
ip flow-export source Vlan2
ip flow-export destination 172.20.27.229 3000
ip flow-aggregation cache as
```

**Step 2** Determine the configured NDE exports by entering:

```
Router#show mls nde
 Netflow Data Export enabled
 Exporting flows to 172.20.27.229 (3000)
 Exporting flows from 172.20.27.221 (57675)
 Version:7
 Include Filter is:
   protocol:TCP
 Exclude Filter not configured
 Total Netflow Data Export Packets are:
    0 packets, 0 no packets, 0 records
 Total Netflow Data Export Send Errors:
        IPWRITE_NO_FIB = 0
        IPWRITE_ADJ_FAILED = 0
        IPWRITE_PROCESS = 0
        IPWRITE_ENQUEUE_FAILED = 0
        IPWRITE_IPC_FAILED = 0
        IPWRITE_MTU_FAILED = 0
        IPWRITE_ENCAPFIX_FAILED = 0

Router#show ip flow export
Flow export is enabled
  Exporting flows to 172.20.27.229 (3000)
  Exporting using source interface Vlan2
  Version 1 flow records
  0 flows exported in 0 udp datagrams
  0 flows failed due to lack of export packet
  0 export packets were sent up to process level
  0 export packets were dropped due to no fib
  0 export packets were dropped due to adjacency issues
  0 export packets were dropped due to fragmentation failures
  0 export packets were dropped due to encapsulation fixup failures
  0 export packets were dropped enqueuing for the RP
  0 export packets were dropped due to IPC rate limiting
```

**Step 3** Configure NDE as follows:

```
Router(config)#mls nde sender
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.

Router(config)#mls rp nde-address 172.20.27.229

Router(config)#mls flow ip full

Router(config)#mls nde flow include protocol tcp

Router(config)#ip flow-export destination 172.20.27.229 3000
```

**Note** The UDP port number must be set at 3000.

```
Router(config)#ip flow-export source vlan 2

Router(config)#ip flow-aggregation cache as

Router(config-flow-cache)#enable

Router(config)#interface GigabitEthernet8/6
Router(config-if)#ip address 1.2.3.4 255.255.255.0

Router(config-if)#ip route-cache flow
```

When you configure a NAM module as an NDE collector, you should use the IP address of the NAM (set up by sessioning into the NAM module).

**Step 4** Synchronize NDE-related information with the NAM by entering:

```
Router#hw-module module 5 sync nde-info
```

This command may prompt you to reset the module. Use this command whenever the NDE configuration and the NAM configuration is completed (such as a VLAN of the NAM management port and that VLAN interface’s IP address and other configuration information).

**Note** If the NAM is not being used as an NDE collector, this step is not required. This step only applies to the NAM that has version 1.2(xx). (NAM version 1.1(xx) is not supported).

## Using SPAN as a Traffic Source

**Note** You can configure SPAN as a traffic source using both the CLI and the NAM Traffic Analyzer application.

To direct SPAN traffic to the NAM for monitoring, configure port 1 on the NAM as the SPAN destination port. You cannot use ports on the NAM module as SPAN source ports.

The NAM can analyze Ethernet VLAN traffic from Ethernet or Fast Ethernet SPAN source ports. You can also specify an Ethernet VLAN as the SPAN source.

The NAM can analyze Ethernet traffic from Ethernet, Fast Ethernet, Gigabit Ethernet, trunk port, or Fast EtherChannel SPAN source ports. You can also specify an Ethernet VLAN as the SPAN source.

To use the SPAN source port as a traffic source for the NAM, set port 1 on the NAM as the SPAN destination port. You cannot set port 2 on the NAM as a SPAN source port.

Refer to the *Catalyst 6000 Family IOS Software Configuration Guide* at the following website for more information on SPAN:

http://www.cisco.com/univercd/cc/td/doc/product/lan/cat6000/index.htm

For more information on configuring SPAN, refer to the switch software configuration guide.

To enable SPAN on the NAM, perform one of these tasks:

| Task | Command |
|---|---|
| Set the source interfaces and VLANs for the monitor session. | Router (config)# **monitor session** *{session_numbe*r} **{source {interface type** *slot/por*t} \| **{vlan** *vlan_I*D}} [, \| - \| **rx** \| **tx** \| **bot**h] |
| Enable port 1 of the NAM as a SPAN destination. | Router (config)# **monitor session** *{session_numbe*r} **{destination {interface type** *slot/por*t} [, \| - ] \| **{vlan** *vlan_I*D}} |
| Disable the monitor session. | Router (config)# **no monitor session** *session_number* |
| Filter the SPAN session so that only certain VLANs are seen from switch port trunks. | Router (config)# **monitor session** *{session_numbe*r} **{filter** *{vlan_I*D} [, \| - ]} |
| Show current monitor sessions. | Router # **show monitor session** *{session_numbe*r} |

This example shows how to enable SPAN on the NAM:

```
Router#show monitor
Session 1
---------
Source Ports:
    RX Only:      None
    TX Only:      None
    Both:         None
```

```
Source VLANs:
    RX Only:      None
    TX Only:      None
    Both:         None
Destination Ports:None
Filter VLANs:     None

Session 2
---------
Source Ports:
    RX Only:      None
    TX Only:      None
    Both:         None
Source VLANs:
    RX Only:      None
    TX Only:      None
    Both:         None
Destination Ports:None
Filter VLANs:     None

Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.

Router(config)#monitor session 1 source vlan 1 both
```

**Note** The SPAN destination for the NAM must always be port 1.

```
Router#
00:21:10:%SYS-5-CONFIG_I:Configured from console by console
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.

Router(config)#monitor session 1 destination interface gi 8/1

Router#show monitor

Session 1
---------
Source Ports:
    RX Only:      None
    TX Only:      None
    Both:         None
Source VLANs:
    RX Only:      None
    TX Only:      None
    Both:         1
Destination Ports:Gi8/1
Filter VLANs:     None

Session 2
---------
Source Ports:
    RX Only:      None
    TX Only:      None
    Both:         None
Source VLANs:
    RX Only:      None
    TX Only:      None
    Both:         None
Destination Ports:None
Filter VLANs:     None
Router#
```

# Catalyst OS Software

These sections describe how to configure the NAM from the CLI:

- Initial Configuration, page 24
- Configuring VLANs, page 27
- Using NetFlow Data Export as a Traffic Source, page 27
- Using SPAN as a Traffic Source, page 28
- Configuring the SNMP Agent, page 29

## Initial Configuration

Before you can use the NAM for network analysis, you must log into the NAM root account and configure the following:

- IP address
- Subnet mask
- IP broadcast address
- IP host name
- Default gateway
- Domain name
- If applicable, the DNS name server.
- If using an external SNMP manager to communicate with the NAM you must configure the following:
  - SNMP MIB variables
  - Access control for the SNMP agent
  - System group settings on the NAM
- Start the web server using the **ip http server enable** command.

To configure these parameters for the NAM, perform these steps in privileged mode:

**Step 1** Verify that the NAM is installed and that the power is on by entering this command:

```
Console> show module mod
```

**Step 2** Establish a console session with the NAM by entering this command:

```
Console> (enable) session mod
```

**Step 3** At the login prompt, type **root** to log into the root account.

**Step 4** At the password prompt, type **root** as the root password.

**Note** If you have not changed the password from the factory-set default, a warning message displays. To change the password from the default, see the "Changing and Recovering the NAM CLI Passwords" section on page 48 for more information.

**Step 5** Configure the IP address and subnet mask by entering this command:

```
root@localhost# ip address ip-address subnet-mask
```

**Step 6** Configure the IP broadcast address by entering this command:

```
root@localhost# ip broadcast broadcast-address
```

**Step 7** Configure the IP host name used in the CLI prompt, **show** commands, and log messages by entering this command:

```
root@localhost# ip host name
```

**Step 8** Configure the default gateway by entering this command:

```
root@localhost# ip gateway default-gateway
```

**Step 9** Configure the domain name for the NAM by entering this command:

```
root@localhost# ip domain domain-name
```

**Step 10** Configure one or more IP addresses as DNS name servers by entering this command:

```
root@localhost# ip nameserver ip-address [ip-address]
```

**Step 11** Verify the NAM configuration by entering this command:

```
root@localhost# show ip
```

**Step 12** Configure the SNMP syslocation MIB variable by entering this command:

```
root@localhost# snmp location location-string
```

**Note** The MIB variables in Step 13 and Step 14 must be valid DisplayString texts, each with a maximum length of 64 characters.

**Step 13** Set the SNMP sysContact MIB variable by entering this command:

```
root@localhost# snmp contact contact-string
```

**Step 14** Set the SNMP sysName MIB variable by entering this command:

```
root@localhost# snmp name name-string
```

**Note** You can delete the SNMP location, SNMP contact, or SNMP name by entering the respective command without any parameters.

**Step 15** Set the SNMP agent community string parameter password for read-write access by entering this command:

```
root@localhost# snmp community community-string rw
```

**Step 16** Set the SNMP agent community string parameter password for read-only access by entering this command:

```
root@localhost# snmp community community-string ro
```

**Note** Clear the SNMP community string with the **snmp delete community** *community-string* command.

**Step 17** Verify the SNMP access controls and settings by entering this command:

```
root@localhost# show snmp
```

After completing this configuration, you can use the NAM with a network-monitoring application, such as TrafficDirector or any other IETF-compliant RMON application.

**Note** If you are using TrafficDirector, you must enter the community strings in TrafficDirector exactly as you enter them in the NAM.

This example shows how to configure the NAM:

```
Console> (enable) session 2
Trying NAM-2...
Connected to NAM-2.
Escape character is '^]'.

Network Analysis Module (WS-X6380-NAM)

login: root
Password:

Network Analysis Module (WS-X6380-NAM) Console, 2.1(1a)
Copyright (C) 1999, 2000, 2001 Cisco Systems, Inc.

WARNING! Default password has not been changed!

root@localhost# ip address 172.20.52.29 255.255.255.224
root@localhost# ip broadcast 172.20.52.31
root@localhost# ip host nam1
root@localhost# ip gateway 172.69.2.132
root@localhost# ip domain cisco.com
root@localhost# ip nameserver 171.62.2.132
root@localhost# show ip
IP address:          172.20.52.29
Subnet mask:         255.255.255.224
IP Broadcast:        172.20.52.31
DNS Name:            nam1.cisco.com
Default Gateway:     172.20.52.1
Nameserver(s):       171.69.2.132
root@localhost#
root@localhost# snmp location “Cisco Lab, Building X, Floor 1”

root@localhost# snmp contact “Jane Doe, Cisco Systems, (408) 111-1111”
root@localhost# snmp name “6k-NAM - Slot 2”
root@localhost# snmp community public ro
root@localhost# snmp community private rw

root@localhost# show snmp

SNMP Agent:   nam1.cisco.com   172.20.52.29

SNMPv1:  Enabled
SNMPv2C: Enabled
SNMPv3:  Disabled

community public read
community private write
```

```
sysDescr         "Catalyst 6000 Network Management Module (WS-X6380-NAM)"
sysObjectID      1.3.6.1.4.1.9.5.1.3.1.1.2.223
sysContact       "Jane Doe, Cisco Systems, (408) 111-1111"
sysName          "6k-NAM - Slot 2"
sysLocation      "Cisco Lab, Building X, Floor 1"
root@localhost#
```

## Configuring VLANs

You do not need to configure a VLAN as the NAM management port because that port automatically synchronizes to the VLAN assigned to interface sc0 on the supervisor engine.

**Note** You cannot set the NAM management port VLAN with the **set vlan** *mod/port* command.

## Using NetFlow Data Export as a Traffic Source

To use NetFlow Data Export (NDE) as a traffic source for the NAM, you must enable the NetFlow Monitor option to allow the NAM to receive the NDE stream. The statistics are presented on reserved ifIndex.3000.

**Note** Configuration of the Multilayer Switch Function Card (MSFC) is necessary for using the NetFlow feature. For information on configuring NDE, refer to the *Catalyst 6000 Family Software Configuration Guide*.

To enable the NetFlow Monitor option, perform these tasks:

| | Task | Command |
|---|---|---|
| **Step 1** | Enable the NetFlow Monitor option. | **set snmp extendedrmon netflow** [**enable** \| **disable**] *mod* |
| **Step 2** | Verify that the NetFlow Monitor option is enabled. | **show snmp** |
| **Step 3** | Enable NDE. | **set mls nde enable** |

This example shows how to enable the NetFlow Monitor option and verify that it is enabled:

```
Console> (enable) set snmp extendedrmon netflow enable 2
Snmp extended RMON netflow enabled
Console> (enable) show snmp
RMON: Enabled
Extended RMON Netflow Enabled : Module 2
Traps Enabled:
None
Port Traps Enabled: None
```

```
Community-Access     Community-String
----------------     --------------------
read-only            public
read-write           private
read-write-all       secret

Trap-Rec-Address                           Trap-Rec-Community
----------------------------------------   --------------------
<...output truncated...>
```

**Note** If a NAM is installed, you do not need to specify an external data collector with a **set mls nde** *collector_ip* [*udp_port_number*] command as described in the *Catalyst 6000 Family Software Configuration Guide*. Ignore messages that the host and port are not set.

## Using SPAN as a Traffic Source

**Note** You can configure SPAN as a traffic source using both the CLI and the NAM Traffic Analyzer application.

To direct SPAN traffic to the NAM for monitoring, you must configure port 1 on the NAM module as the SPAN destination port.

**Note** You cannot use NAM ports as SPAN source ports.

The NAM can analyze Ethernet traffic from Ethernet, Fast Ethernet, Gigabit Ethernet, trunk ports, or Fast EtherChannel SPAN source ports. You also can specify an Ethernet VLAN as the SPAN source.

You can use RSPAN traffic as a SPAN source for the NAM. Verify that the SPAN source is set to the same VLAN ID that is used for RSPAN. The SPAN destination should be set to *nam_module/1*.

For more information on configuring SPAN and RSPAN, refer to the switch software configuration guide.

To set the NAM as a SPAN destination port, perform this task in privileged mode:

| Task | Command |
|---|---|
| Set the NAM as a SPAN destination port. | **set span** {*src_mod/src_ports* \| *src_vlans* \| **sc0**} {*dest_mod*/**1**} [**rx** \| **tx** \| **both**] [**inpkts** {**enable** \| **disable**}] [**learning** {**enable** \| **disable**}] [**multicast** {**enable** \| **disable**}] [**filter** *vlans...*] [**create**] |

**Note** The SPAN destination for the NAM must always be port 1.

## Configuring the SNMP Agent

**Note** If you are using the NAM Traffic Analyzer application, the information in this section is optional.

You can configure the SNMP agent through the CLI or the NAM Traffic Analyzer application. Before you can use the NAM for SNMP support or in hybrid mode using an external SNMP source or a web server, you must log into the NAM root account and configure the following:

- SNMP MIB variables
- Access control for the SNMP agent
- System group settings on the NAM

To configure these parameters for NAM, perform these steps in privileged mode:

**Step 1** Configure the SNMP sysLocation MIB variable by entering this command:

```
root@localhost# snmp location location-string
```

**Note** The MIB variables you enter in Step 13 and Step 14 must be valid DisplayString texts, each with a maximum length of 64 characters.

**Step 2** Set the SNMP sysContact MIB variable by entering this command:

```
root@localhost# snmp contact contact-string
```

**Step 3** Set the SNMP sysName MIB variable by entering this command:

```
root@localhost# snmp name name-string
```

**Note** You can delete the SNMP location, SNMP contact, or SNMP name by entering the appropriate command without any parameters.

**Step 4** Set the SNMP agent community string parameter password for read-write access by entering this command:

```
root@localhost# snmp community community-string rw
```

**Step 5** Set the SNMP agent community string parameter password for read-only access by entering this command:

```
root@localhost# snmp community community-string ro
```

**Note** Clear the SNMP community string with the **snmp delete community** *community-string* command.

**Step 6** Verify the SNMP access controls and settings by entering this command:

```
root@localhost# show snmp
```

After completing this configuration, you can use the NAM with a network monitoring application such as TrafficDirector, NetScout nGenius Real-Time Monitor, or any other IETF-compliant RMON application.

**Note** If you are using TrafficDirector, you must enter the community strings in TrafficDirector exactly as you enter them in the NAM.

This example shows how to configure the NAM:

```
Console> (enable) session 2
Trying NAM-2...
Connected to NAM-2.
Escape character is '^]'.

Network Analysis Module (WS-X6380-NAM)

login: root
Password:

Network Analysis Module (WS-X6380-NAM) Console, 2.1(1a)
Copyright (C) 1999, 2000, 2001 Cisco Systems, Inc.

WARNING! Default password has not been changed!

root@localhost# ip address 172.20.52.29 255.255.255.224
root@localhost# ip broadcast 172.20.52.31
root@localhost# ip host nam1
root@localhost# ip gateway 172.69.2.132
root@localhost# ip domain cisco.com
root@localhost# ip nameserver 171.62.2.132
root@localhost# show ip
IP address:         172.20.52.29
Subnet mask:        255.255.255.224
IP Broadcast:       172.20.52.31
DNS Name:           nam1.cisco.com
Default Gateway:    172.20.52.1
Nameserver(s):      171.69.2.132
root@localhost#
root@localhost# snmp location “Cisco Lab, Building X, Floor 1”

root@localhost# snmp contact “Jane Doe, Cisco Systems, (408) 111-1111”
root@localhost# snmp name “6k-NAM - Slot 2”
root@localhost# snmp community public ro
root@localhost# snmp community private rw

root@localhost# show snmp

SNMP Agent:   nam1.cisco.com   172.20.52.29

SNMPv1:  Enabled
SNMPv2C: Enabled
SNMPv3:  Disabled

community public read
community private write
```

```
sysDescr          "Catalyst 6000 Network Management Module (WS-X6380-NAM)"
sysObjectID       1.3.6.1.4.1.9.5.1.3.1.1.2.223
sysContact        "Jane Doe, Cisco Systems, (408) 111-1111"
sysName           "6k-NAM - Slot 2"
sysLocation       "Cisco Lab, Building X, Floor 1"
root@localhost#
```

# Operating System-Independent Configuration

The following sections describe the NAM configurations that are independent of the switch operating system.

## Configuring Automatic RMON Collections

Use the **autostart** command to specify that some collections should be automatically configured on every available data source (including all known VLANs) whenever the NAM is initialized. These collections may also be configured explicitly through SNMP by a management station on some data sources. Collections that are explicitly configured through SNMP take precedence over “autostart” collections, so if both are configured, only the explicitly configured collections are started on each data source when the NAM initializes.

If you enter the command that instructs the NAM to automatically start a collection, you must reboot the NAM for that command to take effect.

The NAM allows the following collection types to be started automatically:

- addressMap—addressMapTable from RMON2-MIB (RFC 2021)

  If the NMS never sets the addressMapMaxDesiredEntries scalar, then the NAM uses the value -1 (for no limit).
- art—artControlTable from draft-warth-rmon2-artmib-01.txt
- etherStat—etherStatsTable from RMON-MIB (RFC 1757)
- prioStats—smonPrioStatsControlTable from SMON-MIB (RFC 2613)
- vlanStats—smonVlanStatsControlTable from SMON-MIB (RFC 2613)

For example, each dataSource (interface or VLAN) is configured with an etherStatsEntry (from RMON-1) after you enter the **autostart etherstats enable** command and reboot the NAM. The etherStatsOwner field is set to the value *monitor*.

The automatic start process is performed after setting up any collections that were explicitly created through SNMP by a management station, and stored in the NVRAM in the NAM. Automatic start collections are not configured on data sources that already have a collection of that type configured through SNMP.

Enable the etherStat collection type by entering this command from the root account of the NAM:

```
root@localhost# autostart etherstat enable
```

Enable the addressMap collection type by entering this command from the root account of the NAM:

```
root@localhost# autostart addressmap enable
```

Enable the prioStats collection type by entering this command from the root account of the NAM:

```
root@localhost# autostart priostats enable
```

Enable the vlanStats collection type by entering this command from the root account of the NAM:

```
root@localhost# autostart vlanstats enable
```

Disable the vlanStats collection type by entering this command from the root account of the NAM:

```
root@localhost# autostart vlanstats disable
```

After enabling or disabling one or more collection types, you must reboot the NAM before the configuration takes effect.

## Using the ART MIB

The Application Response Time (ART) MIB is enabled and disabled globally. When it is enabled, it measures the response time on the network at the transport layer.

**Note** You must purchase an ART MIB license from Cisco Systems before enabling it and using the ART MIB feature.

To enable the ART MIB, perform this task in privileged mode:

| Task | Command |
|---|---|
| Enable the ART MIB. | **rmon artmib enable** |

To disable the ART MIB, perform this task in privileged mode:

| Task | Command |
|---|---|
| Disable the ART MIB. | **rmon artmib disable** |

## Configuring the HTTP or HTTP Secure Server

Before you can access the NAM through a web browser (HTTP or HTTPS), you must enable the NAM Traffic Analyzer application from the NAM CLI.  For HTTP, use the **ip http server enable** command. For HTTPS, use the **ip http secure server enable** command. Optionally, you also can configure the HTTP (or HTTPS) servers to run on a different TCP port from the default.

**Note** You can use the HTTP server or the HTTP secure server, but not both.

**Note** The **ip http** secure commands are all disabled by default, and you must first download and install the NAM strong crypto patch from www.cisco.com before you can enable them.

## Configuring the HTTP Server

To configure the HTTP server parameters for the NAM, perform these steps in privileged mode:

**Step 1** Configure the HTTP port by entering this command:

```
root@localhost# ip http secure port 8080
The HTTP server is enabled now. You must restart the
server to change HTTP port. Continue [y/n]? y
```

The port number range is from 1 to 65535.

**Note** Web root and guest user names are different from the CLI root and guest users.

**Step 2** Enable the HTTP server by entering this command:

```
root@localhost# ip http server enable
Enabling HTTP server...
No web users configured!
Please enter a web administrator username [admin]:admin
New password:
Confirm password
User admin added.
Successfully enabled HTTP server.
```

**Note** If you encounter the error, “[alert] httpd:Could not determine the server’s fully qualified domain name, using 127.0.0.1 for ServerName” reboot the NAM and the HTTP server will be enabled automatically.

## Installing a Strong Crypto Patch

The **ip http secure** commands are all disabled by default, and you must enable the HTTP secure server by installing a strong crypto patch.

To install a strong crypto patch, perform these steps in the NAM CLI:

**Step 1** Download the patch from www.cisco.com by entering the following command in the NAM CLI:

```
root@localhost# patch ftp-url
```

**ftp-url** is the FTP location and the name of the strong crypto patch.

This example shows how to install a patch:

```
Console># patch ftp://hostname/pub/patch_rpms/cisco-nam-stro
ng-crypto-patchK9-1.0-1.i386.rpm

Proceeding with installation. Please do not interrupt.
If installation is interrupted, please try again.

Downloading cisco-nam-strong-crypto-patchK9-1.0-1.i386.rpm. Please wait...
ftp://hostname/pub/patch_rpms/cisco-nam-strong-crypto-patchK9-1.0-1.i386.rpm (
1K)
-                          [#########################]       1K |   112.15K/s
```

```
1931 bytes transferred in 0.02 sec (107.96k/sec)

Verifying cisco-nam-strong-crypto-patchK9-1.0-1.i386.rpm. Please wait...
Package cisco-nam-strong-crypto-patchK9-1.0-1.i386.rpm verified.

Applying /usr/local/nam/patch/workdir/cisco-nam-strong-crypto-patchK9-1.0-1.i386
.rpm. Please wait...
########################################### [100%]
########################################### [100%]

Patch update completed successfully.
```

**Step 2** After applying the patch, the **ip http secure** commands are enabled, and the following messages are displayed:

```
Console> # ip http secure port 1777
Successfully changed HTTP secure port to 1777.
```

**Step 3** Configure the HTTP port by entering this command:

```
root@localhost# ip http secure port 8080
The HTTP server is enabled now. You must restart the
server to change HTTP port. Continue [y/n]? y
```

The port number range is from 1 to 65535.

**Note** Web root and guest user names are different from the CLI root and guest users.

**Step 4** Enable the HTTP server by entering this command:

```
root@localhost# ip http server enable
Enabling HTTP server...
No web users configured!
Please enter a web administrator username [admin]:admin
New password:
Confirm password
User admin added.
Successfully enabled HTTP server.
```

## Generating Certificates

Certificates are used to validate the secure server connection. You can generate a self-signed certificate or obtain and install a certificate from a certification authority.

Generate a self-signed certificate by entering this command:

```
Console> (enable)# ip http secure generate self-signed-certificate

A certificate-signing request already exists. Generating a
new self signed certificate will invalidate the existing
signing request and any certificates already generated from
the existing request.  Enter y to reuse the existing
certificate-signing request or n to generate a new one.
Reuse existing certificate-signing request?[y/n] y

The HTTP server is enabled now. You must restart
to generate the certificate. Continue [y/n]? y
-----BEGIN CERTIFICATE-----
MIIDAzCCAmygAwIBAgIBADANBgkqhkiG9w0BAQQFADBlMQswCQYDVQQGEwJBVTET
```

```
MBEGA1UECBMKU29tZS1TdGF0ZTEhMB8GA1UEChMYSW50ZXJuZXQgV2lkZ2l0cyBQ
dHkgTHRkMR4wHAYDVQQDExVuYW1sYWItcGlrMy5jaXNjby5jb20wHhcNMDExMDMw
MTAxMDI4WhcNMDIxMDMwMTAxMDI4WjBlMQswCQYDVQQGEwJBVTETMBEGA1UECBMK
U29tZS1TdGF0ZTEhMB8GA1UEChMYSW50ZXJuZXQgV2lkZ2l0cyBQdHkgTHRkMR4w
HAYDVQQDExVuYW1sYWItcGlrMy5jaXNjby5jb20wgZ8wDQYJKoZIhvcNAQEBBQAD
gY0AMIGJAoGBANsO1T5ayA6pvkJad413V+N/ibvND0XRyXfFycTQRzeA8F4A+etV
s0Iq0muFfiL9mDr/es9TkyfIM+T2F6+NE13DxJ53ZBbh7ndb6WOnzeHLKh9EDfSI
cy2s775lCPCjfLcMsWQLWSU7XUbi/ExDpb9e2wQQgi6QBED/YRkr73KNAgMBAAGj
gcIwgb8wHQYDVR0OBBYEFIHsyecd8AW4cvt7voCFeZMarXIqMIGPBgNVHSMEgYcw
gYSAFIHsyecd8AW4cvt7voCFeZMarXIqoWmkZzBlMQswCQYDVQQGEwJBVTETMBEG
A1UECBMKU29tZS1TdGF0ZTEhMB8GA1UEChMYSW50ZXJuZXQgV2lkZ2l0cyBQdHkg
THRkMR4wHAYDVQQDExVuYW1sYWItcGlrMy5jaXNjby5jb22CAQAwDAYDVR0TBAUw
AwEB/zANBgkqhkiG9w0BAQQFAAOBgQACDyWhULAUeSIXyt9tuUrdPfF97hrpFkKy
nj1yEU4piuc9qQtxG9yCGsofAm+CiGFg6P4qJZtBF47mq81qF+48JTYwi68CGCye
suZgw0iCPQVv4KDirHBKFc0Vr/2SMrXcJImczoV2WGcxWxsVaXwpkBKF8pcMFFYd
iOULMcvFxg==
-----END CERTIFICATE-----
Disabling HTTP server...
Successfully disabled HTTP server.
Enabling HTTP server...
Successfully enabled HTTP server.
```

To obtain a certificate from a certification authority, you need to first generate a certificate-signing request and then submit the certificate-signing request manually to the certification authority. After obtaining the certificate from the certification authority, install the certificate.

## Installing Certificates

To install a certificate from a certification authority, follow these steps:

**Step 1** Generate a certificate signing request by entering this command:

```
root@localhost# ip http secure generate certificate-request
A certificate-signing request already exists. Generating a
new one will invalidate the existing one and any certificates
already generated from the existing request. Do you still
want to generate a new one? [y/n] y
5244 semi-random bytes loaded
Generating RSA private key, 1024 bit long modulus
.......................................++++++
.++++++
e is 65537 (0x10001)
Using configuration from /usr/local/nam/defaults/openssl.cnf
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [AU]:IN
State or Province Name (full name) [Some-State]:Tamil Nadu
Locality Name (eg, city) []:Chennai
Organization Name (eg, company) [Internet Widgits Pty Ltd]:Cisco Systems
Organizational Unit Name (eg, section) []:
Common Name (eg, your name or your server's hostname) [hostname.cisco.com]:
Email Address []:xxx@cisco.com
-----BEGIN CERTIFICATE REQUEST-----
MIIBzzCCATgCAQAwgY4xCzAJBgNVBAYTAklOMRMwEQYDVQQIEwpUYW1pbCBOYWR1
MRAwDgYDVQQHEwdDaGVubmFpMRYwFAYDVQQKEw1DaXNjbyBTeXN0ZW1zMR4wHAYD
VQQDExVuYW1sYWItcGlrMy5jaXNjby5jb20xIDAeBgkqhkiG9w0BCQEWEXNla2Fy
```

```
YmNAY2lzY28uY29tMIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQC8+SR503gS
ygkf6pnHuh0LelNf6LqJjzwFfjqjS8vpkFq/QVbwqTNDIggUfbvRAIRWEKVWhpRf
rr+II2o/Xzb0RLpV2J2p3HGgoRrKC3nArIFFiSqXniEU+g2mPqsFNcOyxHNXIxEj
iBQf80DxbmvWFOpunmOQ/pGuEysNfU/46wIDAQABoAAwDQYJKoZIhvcNAQEEBQAD
gYEAVAX89pCAcRDOqPgaBEMQCmWD+wqZPnALovr7C81OLBYTgLLqdwPqoSjSYosE
w/pFnIxWN1sJ7MC8+hjnJJLjoCwbyrEyvoiAvzpsGsnAZgWUVaUpR7jlNbf8x2A1
hAOH9KchS0TpSNy13OyhuAkv0pUcM2AJqB/93u4YvuHfNOA=
-----END CERTIFICATE REQUEST-----
```

**Step 2** Install a certificate obtained from a certification authority by entering this command:

```
root@localhost# ip http secure install certificate
The HTTP server is enabled now. You must restart the
server to install certificate. Continue [y/n]? y

Cut and paste the certificate you received from
Certificate Authority. Enter a period (.), then
press enter to indicate the end of the certificate.
-----BEGIN CERTIFICATE-----
MIIDAzCCAmygAwIBAgIBADANBgkqhkiG9w0BAQQFADBlMQswCQYDVQQGEwJBVTET
MBEGA1UECBMKU29tZS1TdGF0ZTEhMB8GA1UEChMYSW50ZXJuZXQgV2lkZ2l0cyBQ
dHkgTHRkMR4wHAYDVQQDExVuYW1sYWItcGlrMy5jaXNjby5jb20wHhcNMDExMDMw
MTAxMDI4WhcNMDIxMDMwMTAxMDI4WjBlMQswCQYDVQQGEwJBVTETMBEGA1UECBMK
U29tZS1TdGF0ZTEhMB8GA1UEChMYSW50ZXJuZXQgV2lkZ2l0cyBQdHkgTHRkMR4w
HAYDVQQDExVuYW1sYWItcGlrMy5jaXNjby5jb20wgZ8wDQYJKoZIhvcNAQEBBQAD
gY0AMIGJAoGBANsO1T5ayA6pvkJad413V+N/ibvND0XRyXfFycTQRzeA8F4A+etV
s0Iq0muFfiL9mDr/es9TkyfIM+T2F6+NE13DxJ53ZBbh7ndb6WOnzeHLKh9EDfSI
cy2s775lCPCjfLcMsWQLWSU7XUbi/ExDpb9e2wQQgi6QBED/YRkr73KNAgMBAAGj
gcIwgb8wHQYDVR0OBBYEFIHsyecd8AW4cvt7voCFeZMarXIqMIGPBgNVHSMEgYcw
gYSAFIHsyecd8AW4cvt7voCFeZMarXIqoWmkZzBlMQswCQYDVQQGEwJBVTETMBEG
A1UECBMKU29tZS1TdGF0ZTEhMB8GA1UEChMYSW50ZXJuZXQgV2lkZ2l0cyBQdHkg
THRkMR4wHAYDVQQDExVuYW1sYWItcGlrMy5jaXNjby5jb22CAQAwDAYDVR0TBAUw
AwEB/zANBgkqhkiG9w0BAQQFAAOBgQACDyWhULAUeSIXyt9tuUrdPfF97hrpFkKy
nj1yEU4piuc9qQtxG9yCGsofAm+CiGFg6P4qJZtBF47mq81qF+48JTYwi68CGCye
suZgw0iCPQVv4KDirHBKFc0Vr/2SMrXcJImczoV2WGcxWxsVaXwpkBKF8pcMFFYd
iOULMcvFxg==
-----END CERTIFICATE-----
.
Disabling HTTP server...
Successfully disabled HTTP server.
Enabling HTTP server...
Successfully enabled HTTP server.
```

## Enabling Voice Monitoring

The NAM Traffic Analyzer application allows you to view troubleshooting data collected from any enabled voice protocols on the NAM. Enabling voice monitoring allows you to identify potential problems with your voice network.

**Note** You must purchase a separate software license to enable voice monitoring on the NAM.

Before you can use the NAM for voice monitoring, you must log into the NAM root account and perform these steps in privileged mode:

**Step 1** Display the voice monitoring configuration by entering this command:

```
root@localhost# show options
ART mib:          Enabled
Voice monitoring: Disabled
```

**Step 2** Enable voice monitoring and verify the configuration by entering this command:

```
root@localhost# voice monitoring enable
root@localhost# show options
ART mib:          Enabled
Voice monitoring: Enabled
```

**Step 3** Log into the NAM Traffic Analyzer application and click the Monitor tab to configure and display voice monitoring.

## Using a TACACS+ Server

TACACS+ is a Cisco Systems authentication protocol that provides remote access authentication and related services. With TACACS+, user passwords are administered in a central database instead of individual routers, providing a scalable network security solution.

When a user logs into NAM Traffic Analyzer, TACACS+ determines if the user name and password is valid and what access privileges the user has.

Before you can use the NAM with TACACS+, you must configure both the NAM and the TACACS+ server.

To configure the NAM for TACACS+, follow these steps:

**Step 1** Start the NAM Traffic Analyzer application.

**Step 2** Click the **Admin** tab.

**Step 3** Choose **Users**.

**Step 4** Choose **TACACS+**.

**Step 5** Click the Enable TACACS+ Administration and Authentication box.

**Step 6** Follow the instructions in the online help.

# Administering the NAM

How you administer the NAM on your switch depends on whether you are using the Cisco IOS software or the Catalyst OS software. There are also NAM administration tasks that are common to either switch operating system.

The following sections describe how to administrate the NAM from the CLI for each switch operating system:

- Cisco IOS Software, page 38
- Catalyst OS Software, page 46

When you have completed administrating the software-dependent attributes for the NAM, you can configure the software-independent NAM attributes in this section:

- Operating System-Independent Administration, page 53

These sections describe how to administer the NAM:

## Cisco IOS Software

This section contains the various administrative tasks you can perform on the NAM with Cisco IOS:

- Logging in to the NAM, page 38
- Changing and Recovering the NAM CLI Passwords, page 48
- Resetting the NAM, page 49
- Upgrading the NAM Software, page 49

### Logging in to the NAM

The NAM has two user levels with different access privileges:

- guest—Read-only access

  The default password is "guest."
- root—All read and write access

  The default password is "root."

**Note** The root account uses the **#** prompt; the guest account uses the **>** prompt.

To log in to the NAM, follow these steps:

**Step 1** Log in to the Catalyst 6000 family switch using the Telnet connection or the console port connection.

**Step 2** At the CLI prompt, establish a console session with the NAM using the **session slot** *slot_number* **processor** *processor_number* command, as follows:

```
Router#session slot 8 processor 1
The default escape character is Ctrl-^, then x.
You can also type 'exit' at the remote prompt to end the session
Trying 127.0.0.81 ... Open

Cisco Network Analysis Module (WS-X6380-NAM)
```

**Step 3** At the NAM login prompt, type **root** to log in as the root user or **guest** to log in as a guest user.

```
login: root
```

**Step 4** At the password prompt, enter the password for the account. The default password for the root account is "root" and the default password for the guest account is "guest."

```
Password:
```

After a successful login, the command line prompt appears as follows:

```
Network Analysis Module (WS-X6380-NAM) Console, 2.1(1)
Copyright (c) 1999, 2000, 2001 by cisco Systems, Inc.

WARNING! Default password has not been changed!

root@localhost#
```

## Changing and Recovering the NAM CLI Passwords

If you have not changed the password from the factory-set default, a warning message displays when you log in to the NAM.

You can use the web application on the local database. If the administrator is unknown, you can use the CLI to remove the local web users from the web user database with the **rmwebusers** command.

**Note** New passwords must be at least six characters in length, and may include uppercase and lowercase letters, numbers, and punctuation marks.

To change the password, follow these steps while you are logged in to the root account on the NAM:

**Step 1** Enter this command:

```
root@localhost# password [username]
```

To change the root password, Telnet to the NAM and use the password command. The password command without the *username* argument defaults to the root user.

To change the guest password, use the Telnet connection to the NAM and you must use the **password guest** command to change the password.

**Step 2** Enter the new password:

```
Changing password for user root
New UNIX password:
```

**Step 3** Enter the new password again:

```
Retype new UNIX password:
passwd: all authentication tokens updated successfully
```

This example shows how to set the password for the root account:

```
root@localhost# password root
Changing password for user root
```

```
New UNIX password:
Retype new UNIX password:
passwd: all authentication tokens updated successfully
```

If you forget or lose the password, you can enter the **clear module password** command from the CLI to restore the password for the root account to “root” and the guest account to “guest.”

To restore the NAM password to the factory-set defaults, enter this command in privileged mode:

```
Router# clear module pc-module mod password
```

**Note** After this command, you must reset the NAM if the software version is 1.2(1).

## Resetting the NAM

If you cannot reach the NAM through the CLI or an external Telnet session, enter the **hw-mod module module_number reset** command to reset and reboot the NAM. The reset process requires several minutes.

To reset the NAM from the CLI, perform this task in privileged mode:

| Task | Command |
|---|---|
| Reset the NAM. | **hw-mod module** *module_number* **reset** *word*<br>The *word* variable is the string for PC boot device. |

This example shows how to reset the NAM, installed in slot 9, from the CLI:

```
Router#hw-mod mod 9 reset hdd:2

Proceed with reload of module? [confirm] y
% reset issued for module 9
```

**Note** For the boot device, you can specify hdd:1 for the application image or hdd:2 for the maintenance image.

```
Router#
00:26:55:%SNMP-5-MODULETRAP:Module 9 [Down] Trap
00:26:55:SP:The PC in slot 8 is shutting down. Please wait ...
```

To reboot the NAM from the network analysis software, perform this task while you are logged in to the root account on the NAM:

| Task | Command |
|---|---|
| Reset the NAM. | **reboot** |

This example shows how to reboot the NAM:

```
root@localhost#reboot
Reboot the NAM? [Y/N]:y
System reboot in progress..
```

## Upgrading the NAM Software

You can upgrade both the application software and the maintenance software. To upgrade the application software, see the "Upgrading the NAM Application Software" section on page 50. To upgrade the maintenance software, see the "Upgrading the NAM Maintenance Software" section on page 51.

### Upgrading the NAM Application Software

To upgrade the NAM application software, follow these steps:

**Step 1** Copy the NAM application software image to a directory accessible to FTP.

**Step 2** Log in to the switch through the console port or through a Telnet session.

**Step 3** To upgrade the application software, the NAM must be running in the maintenance image. If the NAM is already running in the maintenance image, go to Step 4. Otherwise, enter this command in privileged mode:

```
Router#hw-mod module 9 reset hdd:2
Device BOOT variable for reset = hdd:2
Warning:Device list is not verified.

Proceed with reload of module? [confirm]
% reset issued for module 9
Router#
00:03:31:%SNMP-5-MODULETRAP:Module 9 [Down] Trap
00:03:31:SP:The PC in slot 9 is shutting down. Please wait ...
00:03:41:%SNMP-5-COLDSTART:SNMP agent on host R1 is undergoing a cold
start
00:03:46:SP:PC shutdown completed for module 9
00:03:46:%C6KPWR-SP-4-DISABLED:power to module in slot 9 set off (admin
request)
00:03:49:SP:Resetting module 9 ...
00:03:49:%C6KPWR-SP-4-ENABLED:power to module in slot 9 set on
00:05:53:%SNMP-5-MODULETRAP:Module 9 [Up] Trap
00:05:53:%DIAG-SP-6-BYPASS:Module 9:Online Diagnostics is Bypassed
00:05:53:%OIR-SP-6-INSCARD:Card inserted in slot 9, interfaces are now
online
Router#
```

**Step 4** After the NAM is back online, establish a console session with the NAM and log in to the root account.

```
Router#session slot 9 proc 1
The default escape character is Ctrl-^, then x.
You can also type 'exit' at the remote prompt to end the session
Trying 127.0.0.91 ... Open

Cisco Network Analysis Module (WS-X6380-NAM)

Maintenance Partition

login:root
Password:

Network Analysis Module (WS-X6380-NAM) Console, 1.2(1a)m
Copyright (c) 1999, 2000, 2001 by cisco Systems, Inc.
```

**Step 5** Upgrade the NAM application software by entering:

```
root@localhost#upgrade ftp-url
```

*ftp-url* is the FTP location and name of the NAM software image file.

**Note** If the FTP server does not allow anonymous users, use the following syntax for the *ftp-url* value: ftp://user@host/absolute-path/filename. Enter your password when prompted.

**Step 6** Follow the screen prompts during the upgrade.

**Step 7** After completing the upgrade, log out of the NAM.

**Step 8** Reset the NAM by entering:

```
Router#hw-mod mod 9 reset
Device BOOT variable for reset =
Warning:Device list is not verified.

Proceed with reload of module? [confirm]
% reset issued for module 9

Router#
00:26:55:%SNMP-5-MODULETRAP:Module 9 [Down] Trap
00:26:55:SP:The PC in slot 8 is shutting down. Please wait ...
```

**Step 9** (Optional) Verify the initial configuration after the NAM comes back online by logging into the NAM root account and then entering:

```
root@localhost#show ip
root@localhost#show snmp
```

This example shows how to upgrade the NAM application software:

```
Router#hw-mod module 9 reset hdd:2
Device BOOT variable for reset = hdd:2
Warning:Device list is not verified.

Proceed with reload of module? [confirm]
% reset issued for module 9

Router#
00:16:06:%SNMP-5-MODULETRAP:Module 9 [Down] Trap
00:16:06:SP:The PC in slot 9 is shutting down. Please wait ...
00:16:21:SP:PC shutdown completed for module 9
00:16:21:%C6KPWR-SP-4-DISABLED:power to module in slot 9 set off (admin
request)
00:16:24:SP:Resetting module 9 ...
00:16:24:%C6KPWR-SP-4-ENABLED:power to module in slot 9 set on
00:18:21:%SNMP-5-MODULETRAP:Module 9 [Up] Trap
00:18:21:%DIAG-SP-6-BYPASS:Module 9:Online Diagnostics is Bypassed
00:18:21:%OIR-SP-6-INSCARD:Card inserted in slot 9, interfaces are now
online

Router#session slot 9 proc 1
The default escape character is Ctrl-^, then x.
You can also type 'exit' at the remote prompt to end the session
Trying 127.0.0.91 ... Open

Cisco Network Analysis Module (WS-X6380-NAM)

Maintenance Partition

login:root
Password:
```

```
Network Analysis Module (WS-X6380-NAM) Console, 1.2(1a)m
Copyright (c) 1999, 2000, 2001 by cisco Systems, Inc.

root@hostname.cisco.com#
upgrade ftp://root@hostname-ultra10/tftpboot/c6nam.1-2-1.bin.gz
Password for root@hostname-ultra10:
500 'SIZE c6nam.1-2-1.bin.gz':command not understood.
ftp://root@danlee-ultra10/tftpboot/c6nam.1-2-1.bin.gz (unknown size)
-                          [|]   39103K
40041798 bytes transferred in 34.57 sec (1131.27k/sec)
downloaded image version 2.1(1)

Upgrade file ftp://root@danlee-ultra10/tftpboot/c6nam.1-2-1.bin.gz
is downloaded. Upgrading will wipe out the
contents of the application partition on the hard disk.
Do you want to proceed installing it [y|N]:y

Proceeding with installation. Please do not interrupt.
If installation is interrupted or fails, boot this
partition again and restart upgrade.

00:21:50:%NAM-3-NO_RESP:Module 9 is not responding
Upgrade complete. You can boot the new application partition.
root@hostname.cisco.com# exit

[Connection to 127.0.0.91 closed by foreign host]
Router#

Router#hw-mod module 9 reset
Device BOOT variable for reset =
Warning:Device list is not verified.

Proceed with reload of module? [confirm] y
% reset issued for module 9

Router#
00:24:04:%SNMP-5-MODULETRAP:Module 9 [Down] Trap
00:24:04:SP:The PC in slot 9 is shutting down. Please wait ...
00:24:18:SP:PC shutdown completed for module 9
00:24:18:%C6KPWR-SP-4-DISABLED:power to module in slot 9 set off (admin
request)
00:24:21:SP:Resetting module 9 ...
00:24:21:%C6KPWR-SP-4-ENABLED:power to module in slot 9 set on
00:26:19:%SNMP-5-MODULETRAP:Module 9 [Up] Trap
00:26:19:%DIAG-SP-6-BYPASS:Module 9:Online Diagnostics is Bypassed
00:26:19:%OIR-SP-6-INSCARD:Card inserted in slot 9, interfaces are now
online
```

### Upgrading the NAM Maintenance Software

To upgrade the NAM maintenance software, follow these steps:

**Step 1** Copy the NAM maintenance software image to a directory accessible to FTP.

**Step 2** Log in to the switch through the console port or through a Telnet session.

**Step 3** If the NAM is already running in the application image go to Step 5. If not, enter this command in the privileged mode:

```
Router#hw-mod module 9 reset hdd:1
Device BOOT variable for reset = hdd:1
Warning:Device list is not verified.
```

```
Proceed with reload of module? [confirm]
% reset issued for module 9
Router#
00:31:11:%SNMP-5-MODULETRAP:Module 9 [Down] Trap
00:31:11:SP:The PC in slot 9 is shutting down. Please wait ...
00:31:25:SP:PC shutdown completed for module 9
00:31:25:%C6KPWR-SP-4-DISABLED:power to module in slot 9 set off (admin
request)
00:31:28:SP:Resetting module 9 ...
00:31:28:%C6KPWR-SP-4-ENABLED:power to module in slot 9 set on
00:33:26:%SNMP-5-MODULETRAP:Module 9 [Up] Trap
00:33:26:%DIAG-SP-6-BYPASS:Module 9:Online Diagnostics is Bypassed
00:33:26:%OIR-SP-6-INSCARD:Card inserted in slot 9, interfaces are now
online
```

**Step 4** After the NAM is back online, establish a console session with the NAM and log in to the root account.

**Step 5** Upgrade the NAM maintenance software by entering:

```
root@localhost#upgrade ftp-url
```

*ftp-url* is the FTP location and name of the NAM software image file.

**Note** If the FTP server does not allow anonymous users, use the following syntax for the *ftp-url* value: ftp://user@host/absolute-path/filename. Enter your password when prompted.

**Step 6** Follow the screen prompts during the upgrade.

**Step 7** After completing the upgrade, log out of the NAM.

**Step 8** Boot into the maintenance image with this command to reset the NAM maintenance software:

```
Router#hw-mod module 9 reset hdd:2
Device BOOT variable for reset = hdd:2
Warning:Device list is not verified.

Proceed with reload of module? [confirm]
% reset issued for module 9

Router#
00:16:06:%SNMP-5-MODULETRAP:Module 9 [Down] Trap
00:16:06:SP:The PC in slot 9 is shutting down. Please wait ...
00:16:21:SP:PC shutdown completed for module 9
00:16:21:%C6KPWR-SP-4-DISABLED:power to module in slot 9 set off (admin
request)
00:16:24:SP:Resetting module 9 ...
00:16:24:%C6KPWR-SP-4-ENABLED:power to module in slot 9 set on
00:18:21:%SNMP-5-MODULETRAP:Module 9 [Up] Trap
00:18:21:%DIAG-SP-6-BYPASS:Module 9:Online Diagnostics is Bypassed
00:18:21:%OIR-SP-6-INSCARD:Card inserted in slot 9, interfaces are now
online
Router#
```

**Step 9** (Optional) Verify the initial configuration after the NAM comes back online by logging into the NAM root account and enter the following command:

```
root@localhost# show ip
```

**Step 10** (Optional) Reboot into the application image by entering:

```
Router#hw-mod module 9 reset
```

This example shows how to upgrade the NAM maintenance software:

```
Router#
Router#hw-mod module 9 reset hdd:1
Device BOOT variable for reset = hdd:1
Warning:Device list is not verified.

Proceed with reload of module? [confirm]
% reset issued for module 9
Router#
00:31:11:%SNMP-5-MODULETRAP:Module 9 [Down] Trap
00:31:11:SP:The PC in slot 9 is shutting down. Please wait ...
00:31:25:SP:PC shutdown completed for module 9
00:31:25:%C6KPWR-SP-4-DISABLED:power to module in slot 9 set off (admin
request)
00:31:28:SP:Resetting module 9 ...
00:31:28:%C6KPWR-SP-4-ENABLED:power to module in slot 9 set on
00:33:26:%SNMP-5-MODULETRAP:Module 9 [Up] Trap
00:33:26:%DIAG-SP-6-BYPASS:Module 9:Online Diagnostics is Bypassed
00:33:26:%OIR-SP-6-INSCARD:Card inserted in slot 9, interfaces are now
online
Router#

Router#session slot 9 proc 1
The default escape character is Ctrl-^, then x.
You can also type 'exit' at the remote prompt to end the session
Trying 127.0.0.91 ... Open

Cisco Network Analysis Module (WS-X6380-NAM)

login:root
Password:

Network Analysis Module (WS-X6380-NAM) Console, 2.1(1)
Copyright (c) 1999, 2000, 2001 by cisco Systems, Inc.

root@hostname.cisco.com#
< upgrade ftp://hostname:/pub/rmon/c6nam-maint.1-2-1a-m.bin.gz
ftp://hostname:/pub/rmon/c6nam-maint.1-2-1a-m.bin.gz (119506K)
-                          [########################]  119506K |  611.83K/s
122374624 bytes transferred in 195.33 sec (611.82k/sec)
downloaded image version 1.2(1a)m

Upgrade file ftp://hostname:/pub/rmon/c6nam-maint.1-2-1a-m.bin.gz
is downloaded. Upgrading will wipe out the
contents of the maintenance partition on the hard disk.
Do you want to proceed installing it [y|N]:y

Proceeding with installation. Please do not interrupt.
If installation is interrupted or fails, boot this
partition again and restart upgrade.

Upgrade complete. You can boot the new maintenance partition.
root@hostname.cisco.com# exit

Router#
Router#hw-mod module 9 reset hdd:2
Device BOOT variable for reset = hdd:2
Warning:Device list is not verified.

Proceed with reload of module? [confirm]
% reset issued for module 9
Router#
02:27:19:%SNMP-5-MODULETRAP:Module 9 [Down] Trap
```

```
02:27:19:SP:The PC in slot 9 is shutting down. Please wait ...
02:27:36:SP:PC shutdown completed for module 9
02:27:36:%C6KPWR-SP-4-DISABLED:power to module in slot 9 set off (admin
request)
02:27:39:SP:Resetting module 9 ...
02:27:39:%C6KPWR-SP-4-ENABLED:power to module in slot 9 set on
02:29:37:%SNMP-5-MODULETRAP:Module 9 [Up] Trap
02:29:37:%DIAG-SP-6-BYPASS:Module 9:Online Diagnostics is Bypassed
02:29:37:%OIR-SP-6-INSCARD:Card inserted in slot 9, interfaces are now
online
Router#
```

## Catalyst OS Software

This section contains the various administrative tasks you can perform on the NAM using the Catalyst OS software:

- Logging into the NAM, page 47
- Changing and Recovering the NAM CLI Passwords, page 48
- Resetting the NAM, page 49
- Upgrading the NAM Software, page 49

You can administer the NAM by using the NAM Traffic Analyzer application. Refer to the *User Guide for the Catalyst 6000 Network Analysis Module NAM Traffic Analyzer.*

You can perform these administrative tasks on the NAM:

- Add and remove NAM users and change passwords using either the CLI or the NAM Traffic Analyzer application.
- Recover passwords as superuser (but not change passwords).
- Change local and remote (TACACS+ server) users and passwords by using the NAM Traffic Analyzer application. Refer to the NAM Traffic Analyzer application online help topic “User and System Administration” for information about user and password administration.

- Table 4 describes the user administration tasks you can perform using the CLI and NAM Traffic Analyzer application.

*Table 4 NAM User Administration*

| User Interface | Add Users | Remove Users | Set Password | Recover Password |
|---|---|---|---|---|
| CLI | No | Yes. Use the **rmwebusers** command to remove all webusers from the local database. | Use the **password** command. | Switch CLI. |
| Traffic Analyzer | Add the first user with the CLI when starting the web server. Add all subsequent users through the web GUI for the local database or through TACACS+ if the TACACS+ server is used. | | | |
| Traffic Analyzer local database | Yes | Yes | Yes | Contact the NAM administrator to reset through the GUI.<br>From the NAM CLI, use the **rmwebusers** command. |
| Traffic Analyzer TACACS+ | Yes | Yes | Yes | Use a TACACS+ server, or use the **ip http tacacs+ disable** command. |

## Logging into the NAM

There are two levels of access on the NAM, each with different privileges:

- Guest—Read-only CLI access (default password is guest)
- Root—Full read-write access (default password is root)

**Note** The root account uses the **#** prompt; the guest account uses the **>** prompt.

To log into the NAM, follow these steps:

**Step 1** Log into the Catalyst 6000 family switch using the Telnet connection or the console port connection.

**Note** To allow remote Telnet sessions, use the **exsession on** command.

**Step 2** Establish a console session with the NAM at the CLI prompt, using the **session** *mod* command:

```
Console> (enable) session 2
Trying NAM-2...
Connected to NAM-2.
Escape character is '^]'.

Network Analysis Module (WS-X6380-NAM)
```

**Step 3** To log into the NAM, type **root** to log in as the root user or **guest** to log in as a guest user at the login prompt.

```
login: root
```

**Step 4** At the password prompt, enter the password for the account. The default password for the root account is “root,” and the default password for the guest account is “guest.”

```
Password:
```

After a successful login, the command-line prompt appears as follows:

```
Network Analysis Module (WS-X6380-NAM) Console, 2.1(1a)
Copyright (C) 1999, 2000, 2001 Cisco Systems, Inc.
WARNING! Default password has not been changed!

root@localhost#
```

## Changing and Recovering the NAM CLI Passwords

You can use these methods to change and recover passwords:

- Use a Telnet connection to the NAM and CLI.

  You can configure, change, and recover root and guest passwords:

  - To change the password, use a Telnet connection to the NAM, then use the **password** command to change the password.
  - To recover the password, use the Telnet connection to the supervisor engine, then use the **clear module password** *module* command.

- Use NAM Traffic Analyzer n on the local database.

  You create the initial NAM Traffic Analyzer application user with the CLI. After starting NAM Traffic Analyzer, you can establish and edit additional user passwords. You use NAM Traffic Analyzer or the TACACS+ server to change passwords as follows:

  - As the NAM Traffic Analyzer application administrator, you can reset passwords.
  - If the administrator is unknown, you can use the CLI to remove the local web user database from the web database with the **rmwebusers** command.

- Use the instructions in the TACACS+ server documentation.

If you have not changed the password from the factory-set default password, a warning message appears when you log into the NAM.

**Note** New passwords must be at least six characters in length, and may include uppercase and lowercase letters, numbers, and punctuation marks.

To change a password, follow these steps while logged into the NAM as root:

**Step 1** Enter this command:

```
root@localhost# password [username]
```

**Step 2** Enter the new password:

```
Changing password for user root
New UNIX password:
```

**Step 3** Enter the new password again:

```
Retype new UNIX password:
passwd: all authentication tokens updated successfully
```

This example shows how to set the password for the root account:

```
root@localhost# password root
Changing password for user root
New UNIX password:
Retype new UNIX password:
passwd: all authentication tokens updated successfully
```

If you forget or lose the password, you can enter the **clear module password** command from the CLI to restore the password for the root account to root and the guest account to guest.

To restore the NAM password to the factory-set defaults, enter this command in privileged mode:

```
Console> (enable) clear module password mod
```

## Resetting the NAM

If you cannot reach the NAM through the CLI or an external Telnet session, enter the **reset** command to reset and reboot the NAM. The reset process requires several minutes.

To reset the NAM from the CLI, perform this task in privileged mode:

| Task | Command |
|---|---|
| Reset the NAM. | **reset** *NAM_mod* |

This example shows how to reset the NAM, installed in slot 2, from the CLI:

```
Console> (enable) reset 2
Module 2 shut down in progress, please don't remove module until shutdown completed
Resetting module 2....
2000 Feb 15 15:39:42 %SYS-5-MOD_OK:Module 2 is online
Console> (enable)
```

To reboot the NAM, perform this task while you are logged into the root account on the NAM:

| Task | Command |
|---|---|
| Reset the NAM. | **reboot** |

This example shows how to reboot the NAM:

```
root@localhost# reboot
Reboot the NAM? [Y/N]:y
System reboot in progress..
```

## Upgrading the NAM Software

You can upgrade both the application software and the maintenance software. To upgrade the application software, see the "Upgrading the NAM Application Software" section on page 50. To upgrade the maintenance software, see the "Upgrading the NAM Maintenance Software" section on page 51.

## Upgrading the NAM Application Software

To upgrade the NAM application software, follow these steps:

**Step 1** Copy the NAM application software image to a directory accessible to FTP.

**Step 2** Log into the switch through the console port or through a Telnet session.

**Step 3** To upgrade the application software, the NAM must be running in the maintenance image. If the NAM is already running in the maintenance image, go to Step 4. Otherwise, enter this command in privileged mode:

```
Console> (enable) reset mod hdd:2
```

**Step 4** After the NAM is back online, establish a console session with the NAM and log into the root account.

**Step 5** Upgrade the NAM application software by entering this command:

```
root@localhost# upgrade ftp-url
```

*ftp-url* is the FTP location and the name of the NAM software image file.

**Note** If the FTP server does not allow anonymous users, use the following syntax for the *ftp-url* value: ftp://user@host/absolute-path/filename. Enter your password when prompted.

**Step 6** Follow the screen prompts during the upgrade.

**Step 7** After completing the upgrade, log out of the NAM.

**Step 8** Reset the NAM by entering this command:

```
Console> (enable) reset mod
```

**Step 9** (Optional) Verify the initial configuration after the NAM comes back online by logging into the NAM root account and entering the following commands:

```
root@localhost# show ip
root@localhost# show snmp
```

This example shows how to upgrade the NAM application software:

```
Console> (enable) reset 3 hdd:2
This command will reset module 3.
Unsaved configuration on module 3 will be lost
Do you want to continue (y/n) [n]? y
Module 3 shut down in progress, please don't remove module until shutdown completed.
Console> (enable) 2001 Apr 19 14:33:31 %SYS-5-MOD_RESET:Module 3 reset from Software
2001 Apr 19 14:35:27 %SYS-5-MOD_OK:Module 3 is online

Console> (enable) session 3
Trying NAM-3...
Connected to NAM-3.
Escape character is '^]'.

Cisco Network Analysis Module (WS-X6380-NAM)

Maintenance Partition

login: root
Password:
```

```
Network Analysis Module (WS-X6380-NAM) Console, 2.1(1a)m
Copyright (C) 1999, 2000, 2001 Cisco Systems, Inc.

WARNING! Default password has not been changed!
root@nam5.cisco.com# upgrade ftp://hostname@172.20.52.3/tftpboot/c6nam.1-2-1.bin.gz
Password for hostname@172.20.52.3:


500 'SIZE c6nam.1-1-0-20.gz': command not understood.
ftp://hostname@172.20.52.3/tftpboot/c6nam.1-2-1.bin.gz (unknown size)
-                          [-] 39103K
40041798 bytes transferred in 48.16 sec (811.93k/sec)

Upgrade file ftp://hostname@172.20.52.3/tftpboot/c6nam.1-2-1.bin.gz
is downloaded. Upgrading will wipe out the
contents of the application partition on the hard disk.
Do you want to proceed installing it [Y/N]: y

Proceeding with installation. Please do not interrupt.
If installation is interrupted or fails, boot the maintenance
partition again and restart upgrade.
/usr/local/nam/bin/netinstall /dev/hda1 -inf=/tmp/upgrade.bin

Upgrade complete. You can boot the new application partition.
root@nam5.cisco.com# exit
Console> (enable) reset 3
Module 3 shut down in progress, please don't remove module until shutdown completed.
2000 May 25 09:30:59 %SYS-5-MOD_RESET:Module 3 reset from Software
2000 May 25 09:32:56 %SYS-5-MOD_OK:Module 3 is online
Console> (enable)
```

### Upgrading the NAM Maintenance Software

To upgrade the NAM maintenance software, follow these steps:

**Step 1** Copy the NAM maintenance software image to a directory that is accessible to FTP.

**Step 2** Log into the switch through the console port or through a Telnet session.

**Step 3** To upgrade the maintenance software, the NAM must be running in the application image. If the NAM is already running in the application image, go to Step 4. Otherwise, enter this command in privileged mode:

```
Console> (enable) reset mod hdd:1
```

**Step 4** After the NAM is back online, establish a console session with the NAM and log into the root account.

**Step 5** Upgrade the NAM maintenance software by entering this command:

```
root@localhost# upgrade ftp-url
```

*ftp-url* is the FTP location and the name of the NAM software image file.

**Note** If the FTP server does not allow anonymous users, use the following syntax for the *ftp-url* value: ftp://user@host/absolute-path/filename. Enter your password when prompted.

**Step 6** Follow the screen prompts during the upgrade.

**Step 7** After completing the upgrade, log out of the NAM.

**Step 8** Boot into the maintenance image with this command to reset the NAM maintenance software:

```
Console> (enable) reset mod hdd:2
```

**Step 9** (Optional) Verify the initial configuration after the NAM comes back online by logging into the NAM root account, and enter the following commands:

```
root@localhost# show ip
root@localhost# show snmp
```

**Step 10** (Optional) Reboot into the application image by entering this command:

```
Console> (enable) reset mod hdd:1
```

This example shows how to upgrade the NAM maintenance software:

```
Console> (enable) reset 3 hdd:1
Module 3 shut down in progress, please don't remove module until shutdown completed.
2000 May 25 09:07:46 %SYS-5-MOD_RESET:Module 3 reset from Software
2000 May 25 09:09:38 %SYS-5-MOD_OK:Module 3 is online

Console> (enable) session 3
Trying NAM-3...
Connected to NAM-3.
Escape character is '^]'.

Cisco Network Analysis Module (WS-X6380-NAM)

login: root
Password:

Network Analysis Module (WS-X6380-NAM) Console, 2.1(1a)
Copyright (C) 1999, 2000, 2001 Cisco Systems, Inc.

WARNING! Default password has not been changed!
root@nam5.cisco.com# upgrade
ftp://hostname/pub/rmon/c6nam-maint.1-2-1a-m.bin.gz
ftp://hostname/pub/rmon/c6nam-maint.1-2-1a-m.bin.gz (119506K)
-                         [#######################]   119506K |  755.54K/s
122374624 bytes transferred in 158.17 sec (755.54k/sec)
downloaded image version 1.2(1a)m

Upgrade file ftp://hostname/pub/rmon/c6nam-maint.1-2-1a-m.bin.gz
is downloaded. Upgrading will wipe out the
contents of the maintenance partition on the hard disk.
Do you want to proceed installing it [y|N]:y

Proceeding with installation. Please do not interrupt.
If installation is interrupted or fails, boot this
partition again and restart upgrade.

Upgrade complete. You can boot the new maintenance partition.
root@nam5.cisco.com# exit
```

# Operating System-Independent Administration

The following sections describe NAM administration that is independent of the switch operating system.

## Adding NAM Patch Software

To install a patch on the NAM, follow these steps:

**Step 1** Log into the switch through the console port or through a Telnet session.

**Step 2** To add the patch software, the NAM must be running in the application image. If the NAM is already running in the application image, go to Step 4. Otherwise, if the NAM is in the maintenance image, enter this command in privileged mode:

For Cisco IOS software enter:

```
root@localhost# hw-mod module module_number
root@localhost# reset mod hdd:2
```

For Catalyst OS software enter:

```
Console> (enable) reset mod hdd:1
```

**Step 3** After the NAM is back online, establish a console session with the NAM, and then log into the root account.

**Step 4** Install the patch software to the NAM software by entering this command:

```
root@localhost# patch ftp-url
```

*ftp-url* is the FTP location and the name of the NAM patch software image file.

**Note** If the FTP server does not allow anonymous users, use the following syntax for the *ftp-url* value: ftp://user@host/*absolute-path*/*filename*. Enter your password when prompted.

**Step 5** Follow the screen prompts during the patch application process.

**Step 6** Enter the following command after you apply the patch and set the port.

```
root@localhost# ip heep secure server enable
```

**Step 7** (Optional) Verify the initial configuration after the NAM comes back online by logging into the NAM root account and then entering these commands:

```
root@localhost# show ip
root@localhost# show patches
```

This Catalyst OS software example shows how to apply patch software:

```
Console> (enable) reset 3 hdd:1
Module 3 shut down in progress, please don't remove module until shutdown completed.
2000 May 25 09:07:46 %SYS-5-MOD_RESET:Module 3 reset from Software
2000 May 25 09:09:38 %SYS-5-MOD_OK:Module 3 is online

Console> (enable) session 3
Trying NAM-3...
Connected to NAM-3.
Escape character is '^]'.
```

```
Cisco Network Analysis Module (WS-X6380-NAM)

login: root
Password:

Network Analysis Module (WS-X6380-NAM) Console, 2.1(1a)
Copyright (C) 1999, 2000, 2001 Cisco Systems, Inc.

WARNING! Default password has not been changed!
root@nam5.cisco.com# patch
ftp://hostname/pub/patch_rpms/cisco-nam-system-patch-1.0-1.i386.rpm

Proceeding with installation. Please do not interrupt.
If installation is interrupted, please try again.

Downloading cisco-nam-system-patch-1.0-1.i386.rpm. Please wait...
ftp://hostname/pub/patch_rpms/cisco-nam-system-patch-1.0-1.i386.rpm
(4K)
-                         [#########################]      4K |
1047.61K/s
4114 bytes transferred in 0.00 sec (970.67k/sec)

Verifying cisco-nam-system-patch-1.0-1.i386.rpm. Please wait...
Package cisco-nam-system-patch-1.0-1.i386.rpm verified.

Applying cisco-nam-system-patch-1.0-1.i386.rpm, please wait...
########################################### [100%]
########################################### [100%]


Downloading zsh-3.0.8-8.i386.rpm, please wait...
ftp://hostname/pub/patch_rpms/zsh-3.0.8-8.i386.rpm (492K)
-                         [#########################]    492K |
810.37K/s
503944 bytes transferred in 0.61 sec (809.93k/sec)

Verifying zsh-3.0.8-8.i386.rpm, please wait...
Package /usr/local/nam/patch/workdir/zsh-3.0.8-8.i386.rpm verified.

Applying zsh-3.0.8-8.i386.rpm, please wait...
########################################### [100%]
########################################### [100%]

Downloading nam-system-dummy-1.0-1.i386.rpm, please wait...
ftp://hostname/pub/patch_rpms/nam-system-dummy-1.0-1.i386.rpm (1K)
-                         [#########################]      1K |
1025.45K/s
1574 bytes transferred in 0.00 sec (874.37k/sec)

Verifying nam-system-dummy-1.0-1.i386.rpm, please wait...
Package /usr/local/nam/patch/workdir/nam-system-dummy-1.0-1.i386.rpm
verified.

Applying nam-system-dummy-1.0-1.i386.rpm, please wait...
########################################### [100%]
########################################### [100%]

Restoring data
This may take several minutes, please wait...
Done.

Patch update completed successfully.
root@nam5.cisco.com# exit
```

## Additional NAM Software Administrative Commands

The NAM supports these additional administrative commands:

| Command | Description |
|---|---|
| **config clear** | Clears the NVRAM configuration to the factory-set default condition, including:<br>• Deleting all RMON control tables.<br>• Deleting all RMON1 and RMON2 filters.<br>• Returning the RMON configuration file to the default configuration.<br>No IP host configuration data is deleted.<br>You must reset the NAM after entering the **config clear** command for the change to take effect.<br>This command can be used by the root account only. |
| **coredump ftp://host/*absolute-path*** | Sends a core file to an anonymous FTP server after the RMON agent crashes. You should always copy and save this information to a file before calling the Cisco Technical Assistance Center (TAC). The TAC needs this information to analyze and troubleshoot the NAM. Only one core dump file is maintained. A newly created core dump file overwrites an existing core dump file. This command can be used *only* by the root account.<br>**Note** If the FTP server does not allow anonymous users, use the following syntax: **coredump ftp://***user:password@host/absolute-path.* |
| **exsession** [*on* \| *off*] | Controls whether external Telnet sessions are accepted by the NAM from outside the switch. The default is set to off. If the **exsession** command is set to off, you can only Telnet to the NAM from the supervisor engine on the switch. If the **exsession** command is set to on, new Telnet requests from any valid IP address are accepted. This command will not drop any open sessions. This command can be used by the root account only. |
| **help** [*command*] | Displays a list of top-level commands or additional information for an individual command. |
| **ip address** *ip-address subnet-mask* | Specifies the IP address and subnet for a node on the network. |
| **ip broadcast** *broadcast-address* | Specifies the IP broadcast address for a node on the network. |
| **ip gateway** *default-gateway* | Specifies the default IP gateway. |
| **ip hosts add** *ip address host_name* [**alias 1**] [**alias 2**] | Adds a host entry to the hosts file. |
| **ip hosts add** *ftp://user:passwd@host/full-path/filename* | Adds the host entries from the remote file to the hosts file. |
| **ip hosts delete** | Deletes a host entry from the hosts file. |
| **ip hosts delete** *ftp://user:passwd@host/full-path/filename* | Deletes the host entries from the remote file in the hosts file. |
| **ip nameserver** *ip-addr ip-addr ip-addr* | Specifies the IP name server used to resolve network names into network addresses. |
| **nslookup** *hostname* [**server**] | Allows name server queries for information about a host. If the optional server is not specified, the NAM DNS servers are used. |

| Command | Description |
|---|---|
| **patch** *ftp://user:passwd@host/full-path/filename* | Applies a patch to the application software from the specified location. |
| **ping** [**-nv**] [**-c** *count*] [**-i** *wait*] [**-p** *pattern*] [**-s** *packetsize*] **hostname \| IP address** | Sends ICMP echo-request packets to another node on the network. To configure ping, you can also use the command without arguments.<br>The following options are supported:<br>**-n**—Shows network addresses as numbers.<br>**-v**—Provides verbose output.<br>**-c** *count*—the Stops after sending count ECHO_REQUEST packets.<br>**-i** *wait*—Waits seconds between sending each packet.<br>**-p** *pattern*—Up to 16 pad bytes can be used to fill out packets you send.<br>**-s** *packetsize*—The 8 bytes of ICMP header data. |
| **show autostart** | Enables reporting for statistics, address mappings, VLANs, and MIBs. |
| **show bios** | Displays system information about the BIOS and module (including NAM serial number) that the Cisco TAC might need for troubleshooting. Copy and save the information to a file before calling TAC. This command can be used by both root and guest accounts. |
| **show certificate** | Displays certificates you have installed for secure servers. |
| **show certificate-request** | Displays encrypted certificate request for secure servers. |
| **show cpu** | Displays current processor load on the NAM CPU for all combined functions. This command can be used by both root and guest accounts. |
| **show date** | Displays current time-of-day information maintained by the NAM. This command can be used by both root and guest accounts. |
| **show hosts** | Displays the hosts file. |
| **show ip** | Displays current IP configuration including the HTTP server, secure server, port, secure port, and TACACS+ information. |
| **show memory** | Displays system memory statistics. Memory sizes are rounded to the nearest MB. This command can be used by both root and guest accounts. |
| **show options** | Displays ART MIB and voice monitoring configuration status. |
| **show patches** | Displays installed software patches. |
| **show snmp** | Displays the SNMP configuration. |
| **show tech-support** | Displays system information that the Cisco TAC might need for troubleshooting. Copy and save the information to a file before calling TAC. This command can be used by the root account only. |
| **snmp community** *community-string* {**ro \| rw**} | Sets the SNMP community string value. |

| Command | Description |
|---|---|
| **traceroute** [**-Inv**] [**-f** *first_ttl*] [**-m** *max_ttl*] [**-p** *port*] [**-s** *src_addr*] [**-t** *tos*] [**-w** *waittime*] **destination host name \| IP address** [*packetlen*] | The following options are supported:<br>**-I**—Uses ICMP ECHO instead of UDP datagrams.<br>**-n**—Prints hop addresses numerically.<br>**-v**—Provides verbose output.<br>**-f** *first_ttl*—Sets the initial time-to-live used in the first outgoing packet.<br>**-m** *max_ttl*—Sets the maximum time-to-live (max number of hops) used.<br>**-p** *port*—Sets the base UDP port number used in probes.<br>**-s** *src_addr*—Forces the source address to be something other than the IP address of the interface the packet is sent on.<br>**-t** *tos*—Sets the type-of-service in packets to the following value.<br>**-w** *waittim*—Sets the time (in seconds) to wait for a response to a probe. |
| **upgrade** *ftp://user:passwd@host/full-path/filename* | Upgrades the maintenance software from the specified location. |

The NAM also supports CLI commands for the supervisor engine, which are described in more detail in the *Catalyst 6000 Family Command Reference* publication.

# Cisco IOS Commands

The NAM also supports these CLI commands, which are described in more detail in the *Catalyst 6000 Family IOS Command Reference* publication. These commands are grouped according to mode. These sections describe the Cisco IOS commands that interact with the NAM:

- Exec Commands, page 57
- Configuration Commands, page 58

## Exec Commands

The following commands are all performed in exec mode:

| Command | Description |
|---|---|
| **show module** | Displays installed modules, versions, and states.<br>**Note** This command does not show the signature level. |
| **reload** | Reloads the entire switch. |
| **show running-config** | Displays the configuration that is currently running. |
| **show startup-config** | Displays the saved configuration. |
| **hw-module module slot_number reset** | Resets the module into the application image by default. |
| **hw-module module slot_number reset hdd:2** | Resets the module into the maintenance image. |
| **hw-module module slot_number shutdown** | Resets the module into the maintenance image. |
| **show interfaces Gigabit slot_number/port_number** | Displays status of the interface. |
| **show interfaces switchport module slot_number** | Displays current switch settings for the interfaces. |

| Command | Description |
|---|---|
| **show interface trunk module slot_number** | Displays current trunk settings for the interfaces. |
| **clock set time date** | Sets the current time and date. |
| **clock update-calendar** | Updates the calendar time to the clock time. |
| **clock read-calendar** | Updates clock time to the calendar time. |

## Configuration Commands

The following commands are all performed in either global configuration mode or the interface configuration mode:

- Global Configuration Mode, page 58
- Interface Configuration Mode, page 58

### Global Configuration Mode

The following commands are all performed in global configuration mode:

| Command | Description |
|---|---|
| **power enable module** *slot_number* | Turns the power on for the NAM if it is not already on. |
| **no power enable module** *slot_number* | Shuts down the NAM and removes power. |
| **clock timezone** *zone offset* | Sets the timezone for the switch or NAM. |
| **clock summer-time** ***zone*** **recurring** | Sets the switch to use summertime settings. |
| **clock calendar valid** | Sets the current calendar time as the switch time on startup. |
| **interface GigabitEthernet** *slot number/port number* | Begins configuration for each NAM port. |
| **monitor session session {source {interface** *interface interface-number* \| {**vlan** *vlan-id*}} [ , \| - \| **rx**\| **tx** \| **both**] | Sets the sources for a SPAN session. |
| **monitor session session {destination {interface** *interface interface-number*} [ , \| -] {**vlan** *vlan-id*}} | Sets the destination for a SPAN session. |

### Interface Configuration Mode

The following commands are configuration commands performed in interface configuration mode:

| Command | Description |
|---|---|
| **switchport** | Sets interface as a switchport. |
| **switchport trunk encapsulation dot1q** | Sets dot1q as the encapsulation type. |
| **switchport trunk native vlan** *vlan* | Sets native VLAN for the trunk port. |
| **switchport trunk allowed vlan** *vlans* | Sets allowed VLANs for a trunk. |
| **switchport mode trunk** | Sets the interface as a trunk port. |
| **switchport capture** | Sets the interface as a capture port. |
| **switchport access vlan** *vlan* | Sets the access VLAN for the interface. |
| **switchport mode access** | Sets the interface as an access port. |

## Unsupported Supervisor Engine CLI Commands

These CLI commands are not supported by the NAM:

- **set port broadcast**
- **set port channel**
- **set port cops**
- **set port disable**
- **set port enable**
- **set port flowcontrol**
- **set port gmrp**
- **set port gvrp**
- **set port host**
- **set port inlinepower**
- **set port jumbo**
- **set port membership**
- **set port negotiation**
- **set port protocol**
- **set port qos**
- **set port rsvp**
- **set port security**
- **set port speed**
- **set port trap**
- **set protocolfilter**
- **set rgmp**
- **set rspan**
- **set snmp**
- **set spantree**
- **set trunk**
- **set udld**
- **set vlan**
- **set vtp**

# Troubleshooting the NAM

This section provides troubleshooting information for the NAM.

**Note** Additional troubleshooting help is available to NAM Traffic Analyzer application users in the online help "Troubleshooting" section.

**Symptom** The user is unable to start the Traffic Director capture after using the NAM Traffic Analyzer application capture with a large buffer size.

**Possible Cause** All of the buffer space available for capture sessions was requested and allocated for capture sessions using the NAM Traffic Analyzer application (or the reverse). If you are using more than one entity to simultaneously request NAM resources, such as the NAM Traffic Analyzer application, and the external SNMP managers, such as nGenius RTM or Traffic Director, be sure that you balance the resource allocations.

**Recommended Action** Do not request the maximum capture buffer size in one application and then expect additional buffers available when interacting with the NAM from another application. Only enable autostart when it is required. Autostart can consume more resources than just enabling collections on specific data sources instead of all data sources. Ensure that only the specific capture buffers and collections required are enabled on the NAM. Use the **clear config** and **reboot** commands from the NAM CLI and then restart the applications for capture sessions that you want with minimum buffer allocations. The NAM Traffic Analyzer application also shows all collections enabled on the NAM in the Admin/Diagnostics/Monitor and Capture Configuration screen.

**Symptom** The user receives a verification failed message when installing a patch on the NAM.

**Possible Cause** The time and date on the NAM are not correct, or the patch is not the same as an official Cisco patch. The FTP process may have failed, or the FTP image being pointed to is not a patch (It may be a full application image.)

**Recommended Action** The signature verification used to ensure that the patch is an authentic patch requires an accurate time and date on the NAM and only accepts official Cisco patches.

**Symptom** When a NAM is running in a switch with the Catalyst OS, the NAM may be shown as unreachable by using the **ping** command or NAM Traffic Analyzer.

**Possible Cause** The NAM IP address and the IP address of the switch (interface sc0) are not in the same subnet. This problem can occur if you change the switch IP address and the NAM VLAN assignment. The NAM will automatically synchronize its VLAN assignment to the same VLAN in which the switch (interface sc0) resides. When this occurs, the NAM IP address resides on a different subnet than the VLAN assigned to the NAM. The router then drops any packet destined to the NAM IP address. You cannot add a static route to the router because of route overlap caused by improper VLAN assignments and subnetting.

**Recommended Action** Make sure the NAM IP address and the switch are in the same subnet and in the same VLAN.

**Symptom** Cannot enable the HTTP server.

**Possible Cause** The NAM could not determine the server's fully qualified domain name.

**Recommended Action** Reboot the NAM.

**Symptom** The user cannot connect to the server.

**Possible Cause** The initial configuration is incorrect or not configured.

**Recommended Action** Reconfigure the NAM as described in "Configuring the NAM" section on page 16.

**Symptom** The user cannot connect to the NAM Traffic Analyzer application.

**Possible Cause** The configuration for the HTTP server is not correct.

**Recommended Action** Check the NAM configuration for the HTTP server as described in "Configuring the HTTP or HTTP Secure Server" section on page 32.

**Symptom** When updating software, a nonexisting file is given in the URL.

**Recommended Action** Check the URL and filename.

**Symptom** The user cannot enable the HTTP server.

**Possible Cause** No web users are configured, or a secure server is already enabled.

**Recommended Action** Configure web users as described in "Configuring the HTTP or HTTP Secure Server" section on page 32.

**Symptom** After configuration, the TACACS+ authentication and authorization fails.

**Possible Cause** There are three possible causes: name and password do not match the login configuration in the TACACS+ server; the TACACS+ secret key configured in the NAM does not match the secret key configured in the server; and the wrong TACACS+ server IP address is configured in the NAM.

**Recommended Action** Follow these steps to determine the cause to take the appropriate course of action:

**Step 1** Log in as a local user.

**Step 2** Choose the **Admin > Diagnostics > Tech Support**.

**Step 3** Scroll down to view the /var/log/messages area.

**Step 4** Look for the following messages near the end of the log and take the recommended actions:

**Error Message** `...PAM-tacplus[612]:auth failed:Login incorrect`

**Possible Cause** The name and password do not match the login configuration in the TACACS+ server.

**Recommended Action** Log in to the TACACS+ server and configure the authenticate and authorize NAM user. (See the TACACS+ documentation for information on login configuration.)

**Error Message** `...httpd:tac_authen_pap_read:invalid reply content, incorrect key?`

```
...PAM-tacplus[616]:auth failed:Authentication error, please contact
administrator.
```

**Possible Cause** The TACACS+ secret key configured in the NAM does not match the key in the TACACS+ server.

**Recommended Action** Choose **Admin > User > TACACS+**, and enter the correct secret key.

**Error Message** `...httpd:tac_connect:connection to 172.20.122.183 failed:Connection`

```
timed out
...httpd:tac_connect:all possible TACACS+ servers failed
...PAM-tacplus[613]:connection failed srv 0:Connection timed out
...PAM-tacplus[613]:no more servers to connect
```

**Possible Cause** The wrong TACACS+ server IP address is configured on the NAM.

**Recommended Action** Choose **Admin > User > TACACS+**, and enter the correct TACACS+ server address.

**Symptom** The TACACS+ user can log in successfully but receives the "Not authorized..." error messages when accessing NAM Traffic Analyzer application.

**Possible Cause** The user does not have the necessary access rights.

**Recommended Action** Log in to the TACACS+ server and grant access rights to the affected users. (See the TACACS+ documentation for information on login configuration.)

## Web Username and Password Issues

The following web username and password issues apply:

- You cannot use the CLI username (root or guest) and password to log into the NAM Traffic Analyzer application because they are administered separately. You also cannot use your NAM Traffic Analyzer application username and password to log into the NAM CLI.

  You can create web users with a local database or using TACACS+. You can create a web user with the same username and password as used on the CLI. However, you must still make password changes in both places.
- You can use TACACS+ either in addition to a local database or instead of a local database. (The local database is always checked first.) To use only TACACS+, you can eliminate the local database users by either of these methods:
  - Use the NAM CLI **rmwebusers** command to remove only local users, not TACACS+ users, as they are administered separately on the TACACS+ server.
  - From the **Admin** tab, click **Users**, then delete all local database users individually.

**Caution** Do not delete all local database web users until you have verified that you can log into the NAM Traffic Analyzer application as a TACACS+ user.

- You can recover the password in situations where you have forgotten the local web admin user password, or when another user with account permission logged in and changed the local web admin user password.

  To recover the password if no TACACS+ server is configured on the NAM, follow these steps:

**Step 1** Access the NAM CLI.

**Step 2** Remove all web users by entering this command:

```
rmwebusers
```

Stop the HTTP server and restart the HTTP (or HTTPs, if applicable) server by entering this command:

```
ip http server enable
ip http secure server enable
```

**Step 3** At the prompt, enter the web admin username and password.

You can now log in using the new admin account and create other web accounts by clicking the **Admin** tab, then clicking **Users**.

To recover the password if the TACACS+ server is configured on the NAM, follow these steps:

**Step 1** Log into the NAM Traffic Analyzer application as a TACACS+ user.

You must be configured on the TACACS+ server with Account Management permission.

**Step 2** Change the password of the local web admin user.

**Note** If a TACACS+ server has been configured and the local web user account is deleted, you can still create the web admin user on the TACACS+ server. In this case, the admin user created on the TACACS+ server can log into the NAM Traffic Analyzer application and change the password of the local web admin user, you do not need to create another admin user.

- When the TACACS+ configuration may become confused between the NAM and the TACACS+ server, and a local database user account is not available to fix the TACACS+ configuration on the NAM, you may not be able to fix this problem from the TACACS+ server. To recover the passwords, follow these steps:

**Step 1** Access the NAM CLI.

**Step 2** Enter these commands:

```
rmwebusers
ip http tacacs+ disable
ip http server enable
```

(or **ip http secure server enable** if using HTTPs)

**Step 3** When prompted, enter the new local database admin username and password.

**Step 4** Log into the NAM Traffic Analyzer application.

**Step 5** Click the **Admin** tab.

**Step 6** Click **Users**.

**Step 7** In the contents, click **TACACS+**.

**Step 8** Enter the correct information.

**Step 9** Click **Apply**.

There are restrictions on using passwords when performing upgrades or applying patches. Do not include the password as an argument in upgrade and patch commands. Use command syntax of this form:

```
patch ftp://user@host/full-patch/filename
```

Enter the password when prompted for it.

# Supported RMON and RMON2 MIB Objects

Table 5 lists the RMON and RMON2 MIB objects supported by the supervisor engine and the NAM. The supervisor engine implements some objects from the RMON MIBs as specified in Table 5. The supervisor engine RMON implementation is completely independent of the NAM implementation, and no MIB objects are shared.

To collect etherStats from a physical interface on the switch, configure the etherStatTable on the supervisor engine instead of on the NAM. The etherStats are then collected accurately on multiple physical interfaces simultaneously.

If you are interested in the etherStats for a specific VLAN, configure the etherStatsTable on the NAM. For the data source, use the ifIndex corresponding to the VLAN of interest.

Any alarmVariable configured on the supervisor engine must reference a MIB object on the supervisor engine. An alarmVariable configured on the NAM must reference a MIB object on the NAM.

**Note** You cannot configure an alarmVariable on the NAM that references a MIB object on the supervisor engine or configure an alarmVariable on the supervisor engine that references a MIB object on the NAM.

*Table 5 Supervisor Engine Module and NAM RMON Support*

| Module | Object Identifier (OID) and Description | Source |
|---|---|---|
| Supervisor Engine | ...mib-2(1).rmon(16).statistics(1).etherStatsTable(1)...mib-2(1).rmon(16).statistics(1).tokenRingMLStatsTable(2)<br>...mib-2(1).rmon(16).statistics(1).tokenRingPStatsTable(3) | RFC 1757 (RMON-MIB)<br>RFC 1513 (TOKEN-RING-RMON MIB)<br>RFC 1513 (TOKEN-RING-RMON MIB) |
| | Counters for packets, octets, broadcasts, errors, etc. | |
| Supervisor Engine | ...mib-2(1).rmon(16).history(2).historyControlTable(1)<br>...mib-2(1).rmon(16).history(2).etherHistoryTable(2)<br>...mib-2(1).rmon(16).history(2).tokenRingMLHistoryTable(3)<br>...mib-2(1).rmon(16).history(2).tokenRingPHistoryTable(4) | RFC 1757 (RMON-MIB)<br>RFC 1757 (RMON-MIB)<br>RFC 1513 (TOKEN-RING-RMON MIB)<br>RFC 1513 (TOKEN-RING-RMON MIB) |
| | Periodically samples and saves statistics group counters for later retrieval. | |

*Table 5 Supervisor Engine Module and NAM RMON Support (continued)*

| Module | Object Identifier (OID) and Description | Source |
|---|---|---|
| Supervisor Engine | ...mib-2(1).rmon(16).alarm(3) | RFC 1757 (RMON-MIB) |
| | A threshold that can be set on critical RMON variables for network management. | |
| Network Analysis | ...mib-2(1).rmon(16).alarm(3) | RFC 1757 (RMON-MIB) |
| | A threshold that can be set on critical RMON variables for network management. | |
| Network Analysis | ...mib-2(1).rmon(16).hosts(4) | RFC 1757 (RMON-MIB) |
| | Maintains statistics on each host device on the segment or port. | |
| Network Analysis | ...mib-2(1).rmon(16).hostTopN(5) | RFC 1757 (RMON-MIB) |
| | A user-defined subset report of the Hosts group, sorted by a statistical counter. | |
| Network Analysis | ...mib-2(1).rmon(16).statistics(1).etherStatsTable(1) | RFC 1757 (RMON-MIB) |
| Network Analysis | ...mib-2(1).rmon(16).matrix(6) | RFC 1757 (RMON-MIB) |
| | Maintains conversation statistics between hosts on a network. | |
| Network Analysis | ...mib-2(1).rmon(16).filter(7) | RFC 1757 (RMON-MIB) |
| | A filter engine that generates a packet stream from frames that match a specified pattern. | |
| Network Analysis | ...mib-2(1).rmon(16).capture(8) | RFC 1757 (RMON-MIB) |
| | Manages buffers for packets captured by the Filter group for uploading to the management console. | |
| Supervisor Engine | ...mib-2(1).rmon(16).event(9) | RFC 1757 (RMON-MIB) |
| | Generates SNMP traps when an Alarms group threshold is exceeded and logs the events. | |
| Network Analysis | ...mib-2(1).rmon(16).event(9) | RFC 1757 (RMON-MIB) |
| | Generates SNMP traps when an Alarms group threshold is exceeded and logs the events. | |
| Supervisor Engine | ...mib-2(1).rmon(16).tokenRing(10).ringStationControlTable(1)<br>...mib-2(1).rmon(16).tokenRing(10).ringStationTable(2)<br>...mib-2(1).rmon(16).tokenRing(10).ringStationOrderTable(3)<br>...mib-2(1).rmon(16).tokenRing(10).ringStationConfigControlTable(4)<br>...mib-2(1).rmon(16).tokenRing(10).ringStationConfigTable(5)<br>...mib-2(1).rmon(16).tokenRing(10).sourceRoutingStatsTable(6) | RFC 1513 (TOKEN-RING-RMON MIB)<br>RFC 1513 (TOKEN-RING-RMON MIB)<br>RFC 1513 (TOKEN-RING-RMON MIB)<br>RFC 1513 (TOKEN-RING-RMON MIB)<br>RFC 1513 (TOKEN-RING-RMON MIB)<br>RFC 1513 (TOKEN-RING-RMON MIB) |
| | Aggregates detailed Token Ring statistics. | |

*Table 5 Supervisor Engine Module and NAM RMON Support (continued)*

| Module | Object Identifier (OID) and Description | Source |
|---|---|---|
| Network Analysis | ...mib-2(1).rmon(16).protocolDir(11) | RFC 2021 (RMON2-MIB) |
| | A table of protocols for which the Network Analysis Module monitors and maintains statistics. | |
| Network Analysis | ...mib-2(1).rmon(16).protocolDist(12) | RFC 2021 (RMON2-MIB) |
| | A table of statistics for each protocol in protocolDir(11). | |
| Network Analysis | ...mib-2(1).rmon(16).addressMap(13) | RFC 2021 (RMON2-MIB) |
| | List of MAC-to-network-layer address bindings. | |
| Network Analysis | ...mib-2(1).rmon(16).nlHost(14) | RFC 2021 (RMON2-MIB) |
| | Statistics for each network layer address. | |
| Network Analysis | ...mib-2(1).rmon(16).nlMatrix(15) | RFC 2021 (RMON2-MIB) |
| | Traffic statistics for pairs of network layer addresses. | |
| Network Analysis | ...mib-2(1).rmon(16).alHost(16) | RFC 2021 (RMON2-MIB) |
| | Statistics by application layer protocol for each network address. | |
| Network Analysis | ...mib-2(1).rmon(16).alMatrix(17) | RFC 2021 (RMON2-MIB) |
| | Traffic statistics by application layer protocol for pairs of network layer addresses. | |
| Network Analysis | ...mib-2(1).rmon(16).usrHistory(18) | RFC 2021 (RMON2-MIB) |
| | Extends history beyond RMON1 link-layer statistics to include any RMON, RMON2, MIB-I, or MIB-II statistic. | |
| Supervisor Engine | ...mib-2(1).rmon(16).probeConfig(19) | RFC 2021 (RMON2-MIB) |
| | Displays a list of agent capabilities and configurations. | |
| Network Analysis | ...mib-2(1).rmon(16).switchRMON(22).smonMIBObjects(1).dataSourceCaps(1).dataSourceCapsTable(1) | RFC 2613 (SMON-MIB) |
| | Maps physical entities and VLANs to ifEntries. | |
| Network Analysis | ...mib-2(1).rmon(16).switchRMON(22).smonMIBObjects(1).smonStats(2).smonVlanStatsControlTable(1) | RFC 2613 (SMON-MIB) |
| | Traffic statistics by VLAN ID number. | |
| Network Analysis | ...mib-2(1).rmon(16).switchRMON(22).smonMIBObjects(1).smonStats(2).smonPrioStatsControlTable(3) | RFC 2613 (SMON-MIB) |
| | Traffic statistics by 802.1p user priority value. | |

*Table 5 Supervisor Engine Module and NAM RMON Support (continued)*

| Module | Object Identifier (OID) and Description | Source |
|---|---|---|
| Network Analysis | ...frontier(141).mibdoc2(2).netscout2(1).art(5).artControlTable(2) | draft-warth-rmon2-artmib-01.txt<br>(ART-MIB) |
| | Application response time statistics. | |
| Network Analysis | ...mib-2(1).rmon(16).mediaIndependentStats(21) | (HC-RMON-MIB) |
| | Counters for packets, octets, broadcasts, errors, etc. | |
| | rmon.dsmonMib(26).dsmonObjects(1).dsmonAggObjects(1).dsmonMaxAggGroups(1)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonAggObjects(1).dsmonAggControlLocked(2)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonAggObjects(1).dsmonAggControlChanges(3)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonAggObjects(1).dsmonAggControlLastChangeTime(4)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonAggObjects(1).dsmonAggControlTable(5)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonAggObjects(1).dsmonAggProfileTable(6)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonAggObjects(1)..dsmonAggGroupTable(7) | (DSMON-MIB) |
| | Aggregation or profile control variables and tables | |
| | rmon.dsmonMib(26).dsmonObjects(1).dsmonStatsObjects(2).dsmonStatsControlTable(1)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonStatsObjects(2).dsmonStatsTable(2) | (DSMON-MIB) |
| | Per-datasource statistics collection tables | |
| | rmon.dsmonMib(26).dsmonObjects(1).dsmonPdistObjects(3).dsmonPdistCtlTable(1)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonPdistObjects(3).dsmonPdistStatsTable(2)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonPdistObjects(3).dsmonPdistTopNCtlTable(3)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonPdistObjects(3).dsmonPdistTopNTable(4) | (DSMON-MIB) |
| | Per-protocol statistics collection tables | |
| | rmon.dsmonMib(26).dsmonObjects(1).dsmonHostObjects(4).dsmonHostCtlTable(1)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonHostObjects(4).dsmonHostTable(2)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonHostObjects(4).dsmonHostTopNCtlTable(3)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonHostObjects(4).dsmonHostTopNTable(4) | (DSMON-MIB) |
| | Per-host statistics collection tables | |

*Table 5 Supervisor Engine Module and NAM RMON Support (continued)*

| Module | Object Identifier (OID) and Description | Source |
|---|---|---|
| | rmon.dsmonMib(26).dsmonObjects(1).dsmonCapsObjects(5).dsmonCapabilities(1) | (DSMON-MIB) |
| | DSMON capabilities variable | |
| | rmon.dsmonMib(26).dsmonObjects(1).dsmonMatrixObjects(6).dsmonMatrixCtlTable(1)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonMatrixObjects(6).dsmonMatrixSDTable(2)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonMatrixObjects(6).dsmonMatrixDSTable(3)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonMatrixObjects(6).dsmonMatrixTopNCtlTable(4)<br>rmon.dsmonMib(26).dsmonObjects(1).dsmonMatrixObjects(6).dsmonMatrixTopNTable(5) | (DSMON-MIB) |
| | Matrix statistics collection tables | |

# GNU General Public License

The Catalyst 6000 Network Analysis Module contains software covered under the GNU Public License (listed below). If you would like to obtain the source for the modified GPL code in the Network Analysis Module, please send a request to nam_sw_req@cisco.com.

## License Text

Copyright (C) 1989, 1991 Free Software Foundation, Inc.

59 Temple Place - Suite 330, Boston, MA 02111-1307, USA

Everyone is permitted to copy and distribute verbatim copies

of this license document, but changing it is not allowed.

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software—to make sure the software is free for all its users. This General Public License applies to most of the Free Software Foundation's software and to any other program whose authors commit to using it. (Some other Free Software Foundation software is covered by the GNU Library General Public License instead.) You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the software, or if you modify it.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software.

Also, for each author's protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The "Program," below, refers to any such program or work, and a "work based on the Program" means either the Program or any derivative work under copyright law: that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/or translated into another language. (Hereinafter, translation is included without limitation in the term "modification".) Each licensee is addressed as "you."

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running the Program is not restricted, and the output from the Program is covered only if its contents constitute a work based on the Program (independent of having been made by running the Program). Whether that is true depends on what the Program does.

1. You may copy and distribute verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Program or any portion of it, thus forming a work based on the Program, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) You must cause the modified files to carry prominent notices stating that you changed the files and the date of any change.

b) You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License.

c) If the modified program normally reads commands interactively when run, you must cause it, when started running for such interactive use in the most ordinary way, to print or display an announcement including an appropriate copyright notice and a notice that there is no warranty (or else, saying that you provide a warranty) and that users may redistribute the program under these conditions, and telling the user how to view a copy of this License. (Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the Program is not required to print an announcement.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Program, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

In addition, mere aggregation of another work not based on the Program with the Program (or with a work based on the Program) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:

a) Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as distribution of the source code, even though third parties are not compelled to copy the source along with the object code.

4. You may not copy, modify, sublicense, or distribute the Program except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense or distribute the Program is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

5. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Program or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Program (or any work based on the Program), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Program or works based on it.

6. Each time you redistribute the Program (or any work based on the Program), the recipient automatically receives a license from the original licensor to copy, distribute or modify the Program subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.

7. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system, which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

8. If the distribution and/or use of the Program is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Program under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

9. The Free Software Foundation may publish revised and/or new versions of the General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies a version number of this License which applies to it and “any later version”, you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of this License, you may choose any version ever published by the Free Software Foundation.

10. If you wish to incorporate parts of the Program into other free programs whose distribution conditions are different, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

11. BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

12. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

# Standards Compliance Specifications

Refer to Appendix A, "Specifications," in the *Catalyst 6000 Family Installation Guide* and the *Catalyst 6000 Regulatory Compliance and Safety Information* publication for the standards compliance specifications.

# FCC Class B Compliance

This equipment has complies with the limits for a Class B digital device in accordance with the specifications in part 15 of the FCC rules.

The following information is for FCC compliance of Class B devices: The equipment described in this manual generates and may radiate radio-frequency energy. If it is not installed in accordance with Cisco's installation instructions, it may cause interference with radio and television reception. This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in part 15 of the FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. There is no guarantee that interference will not occur in a particular installation.

Modifying the equipment without Cisco's written authorization may result in the equipment no longer complying with FCC requirements for Class A or Class B digital devices. In that event, your right to use the equipment may be limited by FCC regulations, and you may be required to correct any interference to radio or television communications at your own expense.

**Note** Modifications to this device not specifically approved by Cisco Systems could void the user's authority to continue operating the device.

Refer to the *Catalyst 6000 Family Installation Guide* and the *Catalyst 6000 Regulatory Compliance and Safety Information* publication for additional FCC class compliance information.

# Related Documentation

- For additional FCC class compliance information, refer to the *Catalyst 6000 Regulatory Compliance and Safety Information* publication.
- For additional information about the NAM, refer to the *Catalyst 6000 Family Network Analysis Module Installation and Configuration Note*.
- For additional information about the NAM Traffic Analyzer application, refer to the online help and *User Guide for the Catalyst 6000 Network Analysis Module NAM Traffic Analyzer* (available in PDF format in the online help).
- For additional information about TrafficDirector, refer to the following:
  - *Using the TrafficDirector Application*
  - *Configuring the Catalyst 6000 Network Analysis Module with the TrafficDirector Application*
- For additional information about configuring the NAM for Real Time Monitor (RTM), refer to the following:
  - *Configuring the Catalyst 6000 Network Analysis Module with nGenius Real-Time Monitor*
- For additional information about Catalyst 6000 family switches and command-line interface (CLI) commands, refer to the following:
  - *Release Notes for Catalyst 6000 Family Software Release 6.x*
  - *Catalyst 6000 Family Software Configuration Guide*
  - *Catalyst 6000 Family Command Reference*
  - *Site Preparation and Safety Guide*
- For detailed hardware configuration and maintenance procedures, refer to the *Catalyst 6000 Family Module Installation Guide*.

# Obtaining Documentation

The following sections explain how to obtain documentation from Cisco Systems.

## World Wide Web

You can access the most current Cisco documentation on the World Wide Web at the following URL:

http://www.cisco.com

Translated documentation is available at the following URL:

http://www.cisco.com/public/countries_languages.shtml

## Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which is shipped with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual subscription.

## Ordering Documentation

Cisco documentation is available in the following ways:

- Registered Cisco Direct Customers can order Cisco product documentation from the Networking Products MarketPlace:

  http://www.cisco.com/cgi-bin/order/order_root.pl

- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:

  http://www.cisco.com/go/subscription

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco corporate headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

## Documentation Feedback

If you are reading Cisco product documentation on Cisco.com, you can submit technical comments electronically. Click **Leave Feedback** at the bottom of the Cisco Documentation home page. After you complete the form, print it out and fax it to Cisco at 408 527-0730.

You can e-mail your comments to bug-doc@cisco.com.

To submit your comments by mail, use the response card behind the front cover of your document, or write to the following address:

Cisco Systems
Attn: Document Resource Connection
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

# Obtaining Technical Assistance

Cisco provides Cisco.com as a starting point for all technical assistance. Customers and partners can obtain documentation, troubleshooting tips, and sample configurations from online tools by using the Cisco Technical Assistance Center (TAC) Web Site. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC Web Site.

## Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com is a highly integrated Internet application and a powerful, easy-to-use tool that provides a broad range of features and services to help you to

- Streamline business processes and improve productivity
- Resolve technical issues with online support

- Download and test software packages
- Order Cisco learning materials and merchandise
- Register for online skill assessment, training, and certification programs

You can self-register on Cisco.com to obtain customized information and service. To access Cisco.com, go to the following URL:

http://www.cisco.com

# Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two types of support are available through the Cisco TAC: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Inquiries to Cisco TAC are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

Which Cisco TAC resource you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

## Cisco TAC Web Site

The Cisco TAC Web Site allows you to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to the following URL:

http://www.cisco.com/tac

All customers, partners, and resellers who have a valid Cisco services contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to the following URL to register:

http://www.cisco.com/register/

If you cannot resolve your technical issues by using the Cisco TAC Web Site, and you are a Cisco.com registered user, you can open a case online by using the TAC Case Open tool at the following URL:

http://www.cisco.com/tac/caseopen

If you have Internet access, it is recommended that you open P3 and P4 cases through the Cisco TAC Web Site.

## Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses issues that are classified as priority level 1 or priority level 2; these classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer will automatically open a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to the following URL:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled; for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). In addition, please have available your service agreement number and your product serial number.

This document is to be used in conjunction with the documents listed in the "Related Documentation" section.